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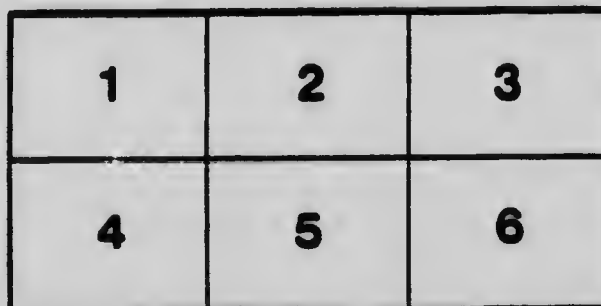
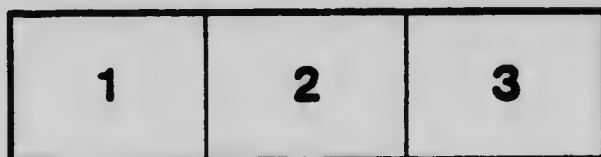
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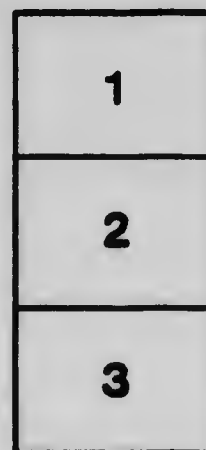
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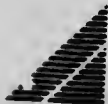
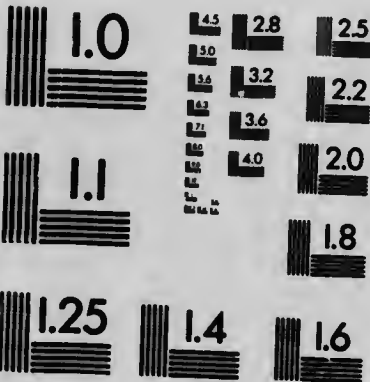
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DEPARTMENT OF AGRICULTURE
CENTRAL EXPERIMENTAL FARM
OTTAWA, CANADA

ON THE
BREEDING, FEEDING AND GENERAL MANAGEMENT

OF
P O U L T R Y

PART I

BY

A. G. GILBERT

Poultry Manager

PART II

BY

VICTOR FORTIER

Assistant Poultry Manager

BULLETIN No. 54

FEBRUARY, 1906

PUBLISHED BY INSTRUCTION OF THE HON. SYDNEY FISHER, MINISTER OF AGRICULTURE
OTTAWA, ONT

*Avec les Compliments
de
Victor Fortier*

CA. 2. 1990-1913

DEPARTMENT OF AGRICULTURE

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CENTRAL EXPERIMENTAL FARM

OTTAWA, CANADA

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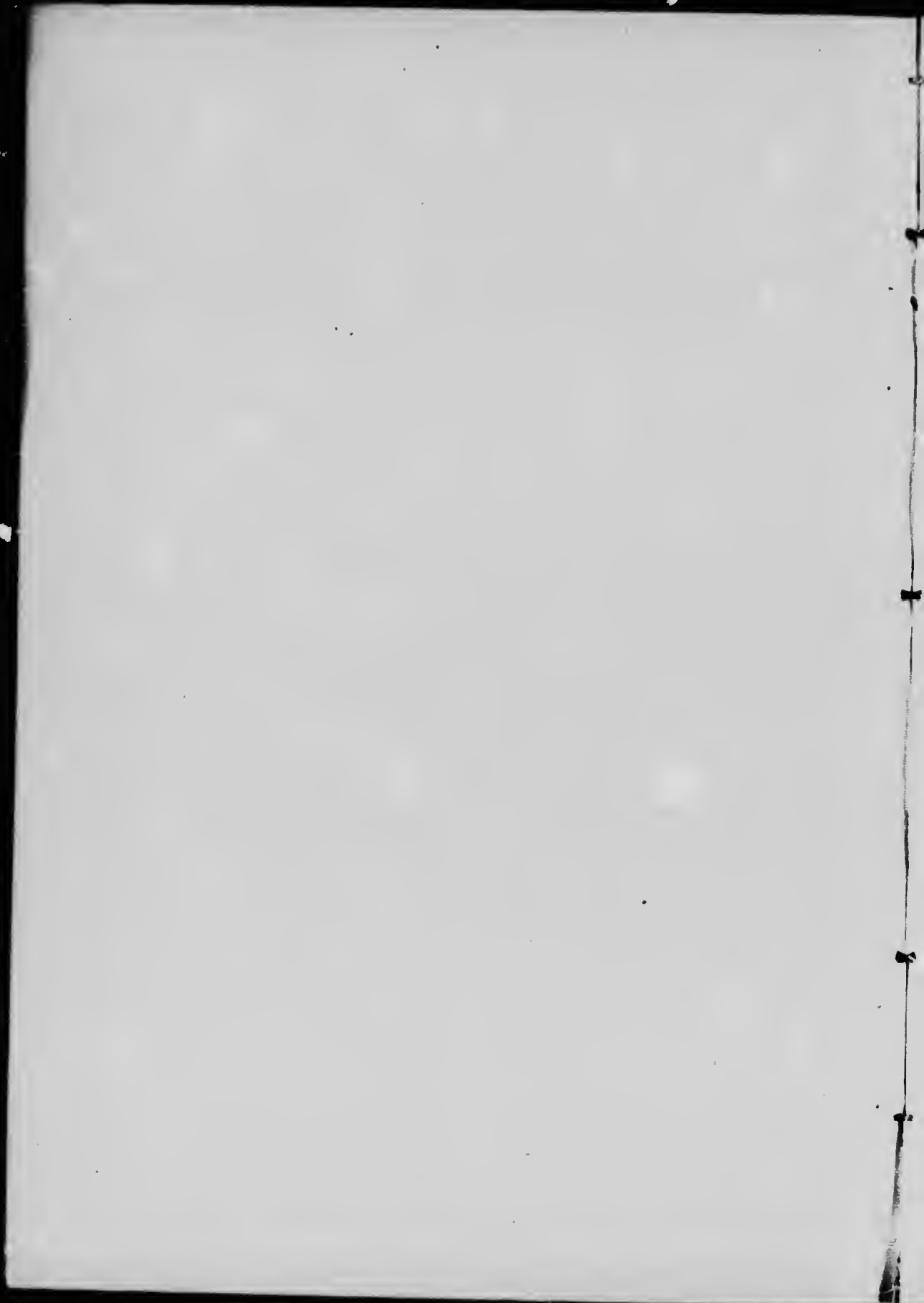
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OTTAWA, ONT.



To the Honourable

The Minister of Agriculture.

SIR,—I have the honour to submit for your approval Bulletin No. 54, of the Experimental Farm series, on 'The Breeding, Feeding and General Management of Poultry', prepared under my direction jointly by the Poultry Manager and the Assistant Poultry Manager of the Central Experimental Farm.

Part I has been written by Mr. A. G. Gilbert, Poultry Manager. In this is discussed the principles underlying profitable poultry raising; description of breeds; rations and manner of feeding them; the moulting of fowls with methods of shortening this period of non-production; and other topics. There are also short chapters on turkeys, ducks and geese.

Part II has been prepared by Mr. Victor Fortier, Assistant Poultry Manager. This treats of incubation, natural and artificial; poultry raising; the fleshing of chickens and the fattening of hens; poultry buildings and runs, and the general treatment of poultry including diseases, injuries, &c.

The subjects discussed are of wide and general interest. The poultry industry is developing rapidly in Canada, and there is an abundance of room and opportunity for a still further extension of this profitable branch of farm work.

It is hoped that the information contained in this bulletin, the result of the accumulated experience of many years, will prove helpful to farmers generally throughout the Dominion; to those who are engaged in poultry keeping in towns and cities, also to such as are making a specialty of the poultry business, and that thus a considerable impetus may be given to this most important industry.

I have the honour to be,

Your obedient servant

WM. SAUNDERS,

Director of Experimental Farms.

OTTAWA, February 1, 1906.



PART I

THE BREEDING, FEEDING AND GENERAL MANAGEMENT OF POULTRY.

(By A. G. GILBERT, *Poultry Manager, Central Experimental Farm.*)

The aim of this bulletin is to place in the hands of the farmers and others interested in successful poultry culture—throughout the Dominion—such information as long experience has shown to be best calculated, when put into practical operation, to bring the largest returns at the least cost.

That there is a paying margin of profit in properly managed poultry has been shown by experimental work as well as by results achieved by well known farmers and published by them, from time to time, in the Poultry and Agricultural press. That margin of profit has been found to vary in amount according to the favourable or unfavourable circumstances of the producers. Some are more favourably situated as regards location to a good market than others; some may have feed in greater quantity and at cheaper cost than others, climatic influences may be a factor in certain cases, but under all the conditions named satisfactory percentages of profit have been secured. Farmers in the neighbourhood of a city or town market where high prices are common, or, within easy reach by railroad of the same, have better opportunity to make a larger margin of profit than those in other parts of the country and who by force of circumstances have to sell to the collector of eggs and chickens, or, to country stores, transactions with the latter being often in the way of trade.

WHAT IS A FAIR MARGIN OF PROFIT?

Under favourable conditions farmers who have corresponded with our department or the press have stated their margin of profit to be highly satisfactory.

Mr. A. McPhadden, Dominionville, Ont., president of the local Farmers' Institute, has stated that by selling new laid eggs in winter at 40 cents per dozen and a superior quality of poultry in the early fall months at 10 cents a pound to Montreal dealers that he has found, after a careful account of cost, a profit of two hundred per cent.

Mr. Wm. Moe, of South Franklin, Que., claims by obtaining eggs in winter and sending them to a Montreal dealer as well as his poultry in summer to make one hundred and eighty per cent over cost.

J. R. H. of Wentworth Co., Ont., in *Farmers' Advocate* of March 9 last says after describing his methods of management:—'Have had eggs all fall and winter in good supply. Have kept account and have sold more than \$2 worth of eggs for every \$1 worth of feed consumed. And in growing early chickens for market have had \$3 for \$1 cost. I find I can raise chicks to eight weeks for \$8 per hundred and make them ready for market. Yes, my hens pay and pay well.'

Our own experimental work has also shown satisfactory profit over cost of feed.

THOROUGH KNOWLEDGE OF MANAGEMENT ESSENTIAL TO SUCCESS.

But before margins of profit, such as shown, can be secured, it must be borne in mind that a thorough knowledge of how to manage is imperative. Successful poultry keeping is an exact and exacting science. Exact, because if not enough food is given there is little or no product, if too much, the fowls become too fat and the result is the

same. Exacting, because adaptability, keen observation, untiring perseverance, and a proper appreciation of the value of little essentials, coupled with a liking for the occupation are indispensable. The roadway to successful poultry keeping is strewn with the wrecks of individual, or combined effort, in attempts at attaining profitable results without the requisite knowledge of how to do so. It is well that this should be understood, at the outset, by the large number of correspondents from whom so many letters are received on the subject of poultry keeping. These correspondents may be classified as follows:—

1. The correspondent who has heard that there is a large margin of profit in the production of broilers, and would like a description of the necessary plant, method of management, estimate of outlay and all particulars in order to successfully prosecute the business. Would selling the eggs in winter at 40 cents per dozen pay better than by converting them into 'broilers'?
2. The correspondent who is confident that there is money in poultry. Having a limited sum of money, is willing to invest it in a small poultry plant. Has little or no knowledge of poultry, but would like all information as to quantity of land required, latest styles of poultry houses, number and kind of fowls, whether grain feed should be grown or purchased, most economical rations, and all such instruction as is calculated to lead to success.
3. The enquirer who has lost his health in business. He is convinced that poultry keeping may be made a means of livelihood as well as a restoration of health. Desires information as to the quickest way of acquiring knowledge of how to proceed.
4. The correspondent who has had experience in poultry raising in the mother country and intends to devote his time to its prosecution in this country in conjunction with market gardening, or small fruits, or both, would like all information as to most suitable breeds of fowls, accommodation, feed and management most suitable to this country.
5. The enquirer who is situated on the outskirts of the city and has time and room to permit of the pleasurable and profitable keeping of a number of fowls. How best can he carry out his intention?
6. From farmers enquiring as to what has been found the best variety of fowls for eggs and flesh, the best and cheapest style of poultry house, how many fowls can be profitably handled by one man, and where are the best paying markets for eggs in winter and chickens in summer?

ANSWERS TO THE ABOVE.

It is evident that the operations outlined by Nos. 1, 2 and 3 would be that of specialists requiring expert knowledge and special facilities. Such knowledge can best be acquired by an apprenticeship at a large poultry plant of which, at present, there are only two or three in Canada, but many in the eastern United States. Broiler raising is the most advanced phase of poultry keeping, requiring 'marked aptitude' in combination with expert knowledge and a special plant. Operations in large establishments commence in November or December and from that time forth chickens are artificially hatched and reared in great numbers until put on the market in spring and early summer, say from March to June, the period of highest prices. Broilers are usually sold at two or three months of age, averaging from one to one and half pounds each or two to three pounds per pair and are worth \$1.25 to \$1.50 per pair. The hatching and rearing of ducklings in the manner described is conducted on a very large scale by several large establishments. The young ducks are placed on the market at nine to ten weeks of age and usually weigh four to four and a half pounds each or eight to nine pounds per pair. Broiler raising is a branch of poultry culture not suitable to the ordinary farmer who, if he has eggs, will find far more profit in selling them at thirty, thirty-five or forty cents per dozen than by attempting to convert them into broilers.

Nos. 4 and 5 will find much useful information in the reports issued from our poultry department and from this bulletin. They may also learn by experience, which is inevitably slow but with them need neither be unpleasant nor unprofitable. Attend-

ance at a short course of poultry instruction at one of the agricultural colleges would doubtless be beneficial. Long experience has shown that unless practice is combined with theoretical instructions only partially satisfactory results are likely to be attained.

No. 6 is the case of the farmer which is entirely different from the others. Poultry keeping is essentially his business. Fowls are probably part of his live stock and of handling them he is likely to have already some knowledge. His poultry may not be of the most suitable variety, or his poultry house of the latest design. But these can be quickly remedied. He has the grain, the roots and other essentials in abundance, frequently in the shape of waste. To him the Experimental Farm reports and other publications are invaluable. He can, with the knowledge he is already possessed of, take the full benefit out of a short poultry course at an agricultural college. His position is generally such that by giving his poultry proper care and attention he can make them a profitable addition to his income.

DEALING WITH THE FARMER.

In dealing with poultry keeping and the farmer the exigencies of the latter, as to situation and circumstances, must be thoroughly understood. To the farmer his poultry is only one of many different branches of farm work. It would be simply misleading to induce him to keep more fowls, or, hatch out more chickens than he can successfully manage and rear. It is ever to be borne in mind that the great bulk of the egg and poultry supply must come from the farmers of the country, at all seasons of the year. It is also to be remembered that it is not from a few farmers with a great many hens each, that the largest proportion of this supply will come, but rather from the many farmers, with a few hens each, and who are, therefore, more likely to manage them successfully. There is no reason, however, why a farmer should not make a specialty of poultry raising, if inclination and circumstances lead him to do so. From 100 to 150 hens should not be too many for the ordinary farmer to profitably handle, and it should not be difficult for him to hatch out, and rear to marketable age 150 chickens. If he has help from wife or family, a larger number might be reared. How and at what season he can most conveniently and successfully do so is shown in the following pages.

THE MARKETS AND THEIR DEMANDS—THE FARMER'S OPPORTUNITIES.

There are two great markets open to producers, viz.:—The Home and British Markets. Both offer remunerative prices for the reliable product in the shape of eggs, and the superior quality of poultry at almost all seasons of the year.

The Home Market calls for fresh eggs and good poultry at all periods of the year. The better the quality of the poultry and the fresher the eggs the better are the prices obtained. The prices paid for new laid eggs in winter in the leading cities of the Dominion, range from 35 to 50 cents per dozen; for poultry, from 20 cents per lb. for early birds, to 15, 10 and 8 cents as the season advances. In London, Ont., the winter price of new laid eggs is 22 to 25 cents per dozen, but these are exceptionally low figures, general climatic conditions, doubtless, making the obtaining of eggs in winter comparatively easy. The aim of the producer, in this case, should be to reach the higher price markets of Toronto and Montreal. For both poultry and eggs, there is an increasing demand. The aim of the farmer should be to produce both at the seasons of the year when they are worth most money. A striking feature of the summer egg trade of the past two years has been the high price paid by leading purveyors, for the strictly new laid article. As high as 20. and in some cases 25 cents per dozen were paid last summer. The cause of these high prices is, perhaps, given in the words of a leading city grocer—with a choice trade—who remarked to the writer, 'Our customers will not have any other kind than the strictly new laid eggs with the flavour peculiar to them,' and we must try and meet this demand. Whether these unusual summer prices are only temporary, or, are likely to be permanent

remains to be seen, but the trend of the markets, in recent years, is to increase rather than decrease the value of the choice product.

The British Market and its requirements are:—Large eggs, 7 or 8 of which should weigh one pound, and preferably of brown shell. They should be of good flavour and as fresh as possible; clean and carefully packed, so as to present an inviting appearance on arrival.

Poultry only of the best market types and quality should be shipped, in order to secure the highest prices. As in the case of eggs, appearance and quality are great factors in determining values.

The careful packing of poultry and eggs may be attended to by the shippers, but it is only the farmers who can place the fresh eggs and poultry of the desired type and quality in the hands of middleman, storekeeper or shipper. Cold storage facilities are such that the products are kept in excellent condition *en route*.

HOW THE REQUIREMENTS OF THE MARKET MAY BE RESPONDED TO.

Farmers and other producers should at once realise that success in meeting the requirements of the markets enumerated can best be brought about by compliance with the following conditions, viz.:—

1. Their fowls should be of a variety that are as nearly all the year round money makers as it is possible to have them.
2. They should come from constitutionally strong and good egg-laying strains.
3. They should be good winter layers; moult in midsummer, and be of the best market types, so that their progeny will be the same.
4. To have the winter layer and flesh producer combined will necessitate a choice of one of the dual purpose or utility varieties, as described further on.
5. Should eggs only be required for selling at all seasons, except the moulting period, one of the non-sitting varieties will answer the purpose.
6. In procuring eggs or stock the purchaser should carefully ascertain that they come from the best egg-laying strains and market types.

THE DIFFERENT BREEDS AND THEIR CHARACTERISTICS.

Long experience has shown that no varieties of fowls are better suited to the requirements of farmers and others than barred and white Plymouth Rocks, white Wyandottes and buff Orpingtons. Both barred Plymouth Rocks and white Wyandottes are to be found in every locality, and eggs from them may be had at reasonable cost. No variety seems to have a greater hold on the farming community than the barred Plymouth Rock. The Orpingtons are comparatively new comers, but have rapidly made their way to a first place in the utility class. Particularly may this be said of the buff variety. The points of merit of the different varieties of the most serviceable breeds are as follows:—

PLYMOUTH ROCKS.

There are three varieties of this breed, viz.: barred, white and buff, all of which are good for eggs and flesh. The following descriptions refer to these different varieties:—

Barred Plymouth Rocks.—As shown in No. 1, plate 1. Natives of America, first making their appearance in the Eastern States. Pure bred birds should have yellow beaks, legs and toes. Faces, combs and wattles bright red. Eyes bright and rich bay. The plumage should be bluish gray and distinctly barred to the skin. Young females sometimes have a slightly dark stripe down the beak, but this is permissible in young birds. Well bred females make good winter layers up to two years of age; after this they are apt to put on fat and become unprofitable. The chickens are hardy, of good market type, and should make when properly fed and cared for, weight development of

one pound to one pound and a quarter per month especially after the first month. The standard weights of this variety are :—

	Lb.	Oz.
Cock	9	8
Cockerel	8	0
Hen	7	8
Pullet	6	8

Colour of eggs, dark or light brown, according to strain.

White Plymouth Rocks—(See No. 2, plate 1.)—A popular and well known variety and one which seems to be improving from year to year, doubtless the result of careful breeding. The points are the same as in the Barred Plymouth Rocks, with the exception of plumage, which should be pure white. Weights are the same as in the first-named variety. Colour of eggs brown, preferably dark brown.

Buff Plymouth Rocks.—A variety which is not so old as the two others named, but one which is gaining many friends on account of its merits as well as handsome appearance. The weights and points are the same as with the others with the exception of plumage, which should be golden buff of even shade.

Wyandottes.—The Wyandotte family, which is well known and popular, is composed of several varieties, viz. :—

Silver Laced Wyandottes.—The first and oldest variety and one possessing much merit as a layer and market fowl, as well as beauty of plumage. The hens make good winter layers, good sitters and good mothers. The chickens are hardy and make quick growth. Of late *Silver Laced Wyandottes* have not been so numerous as in previous years, perhaps owing to the favour with which the newer and equally good varieties have been received, notably the White. For standard weights see White variety. Colour of egg, light brown.

White Wyandottes.—(See No. 3, plate 2.)—A typical fowl for the farmer, being blocky, broad in breast, with meaty body and having a low rose comb. Hens are excellent winter layers. Chickens are hardy and make flesh development equal to that of the *Barred Plymouth Rocks*. Great favourites with broiler raisers, particularly in the Eastern States.

Standard weights are :—

	Lb.
Cock	8½
Cockerel	7½
Hen	6½
Pullet	5½

Distinguishing points are :—Yellow beak, shanks and toes ; bright red comb, face, wattles and earlobes ; plumage and quills, pure white ; colour of egg, light brown.

Golden Wyandottes.—A very handsome as well as useful variety, and one which has many friends and admirers. The plumage is beautifully marked and is described in the language of the Standard as, 'short, close, golden bay in colour with a black stripe on the feathers, wide at the base and extending to a fine point.' Weights, same as the white variety.

Buff and Black Wyandottes are to be found in many localities. The former are in greater number than the latter. They are useful as well as handsome, and are likely to occupy a front place among the utility breeds. Weights same as the white variety.

Other breeds of the American class are :—

Javas.—Black, mottled and white.

Dominique.—One variety called the American Dominique. It is noted as a progenitor of the Barred Plymouth Rock.

Jersey Blue.—A variety comparatively unknown outside of the Eastern States where it originated.

Rhode Island Reds.—A popular breed and one found in the hands of many farmers in the state in which it originated and the name of which it bears. They are becoming

more popular in other localities owing to their good reputation as layers and market types. The flesh has a slightly yellow tinge, which makes it rather acceptable to the prevailing taste in the United States.

ASIATIC GROUP.

The Asiatic family is the oldest one known in poultry history, and from it may be traced many of the most popular English, French and American varieties of to-day. This class is composed of eight varieties, as follows:—

Light Brahmas.—(See No. 4, plate 2.)—A large and handsome fowl, which for a long period has been a great favourite as layer and table fowl, and is yet so regarded by many breeders. The advent of the more rapidly maturing and smaller boned Plymouth Rock and Wyandotte fowls has been the cause of the Brahmas taking second place as a leading general purpose variety. For many years they were the choice variety with Eastern States broiler raisers. Now the White Wyandottes or Barred Plymouth Rocks have largely taken their place. Some strains are excellent layers of dark brown eggs of large size. Chicks are hardy and make steady growth. Hens are rather heavy to put on early spring eggs when shells are apt to be thin, but they are quiet and careful mothers. Light Brahmas are the heaviest variety of the Asiatic breeds.

Standard weights are:—

	Lb.
Cock.....	12
Cockerel... ..	10
Hen.....	9½
Pullet.....	8

In pure-bred Light Brahmas the points called for are: Bright red face, comb, wattles and ear-lobes; yellow shanks and toes; beak, yellow with dark stripe down the upper mandible.

Dark Brahmas.—Are not so numerous or well known among the farming community as the light variety. The females are beautifully marked. Characteristics much the same as the variety first named. The standard weights of this variety are slightly different from the whites, and are:—

	Lb.
Cock....	11
Cockerel.....	9
Hens.....	8½
Pullets.....	7

Buff Cochins.—Are a well-known and favourite variety of the Cochin group. They have been extensively used for crossing purposes both in the older countries and on this continent. Crosses of Buff Cochin with Indian Game and Dorking have long been favourite broiler-making crosses. The hens of this variety lay a dark brown egg of large or small size according to age. They make faithful mothers and their chickens are hardy. The weights of this group are the same as Dark Brahmas.

White, Black and Partridge Cochins.—Are well known and liked. Hens are layers of dark brown eggs of rich colour and fairly large size. They make excellent mothers. Chickens hardy. The male of the black is half a pound lighter than those of the other varieties. Weights of all the others the same as in the case of Dark Brahmas.

Black and White Langshans.—Of these the former variety is much the best known, but both have good points as layers and table fowls. Their flesh is white, of fine grain and superior quality. The females lay eggs of medium size and of rich brown colour. Chicks are hardy and grow well. Hens make excellent mothers.

Standard weights are:—

	Lb.
Cock ..	10
Cockerel ..	8
Hens.....	7
Pullets.....	6

MEDITERRANEAN GROUP.

This family is composed of four breeds, viz.: Leghorn, Minorca, Andalusian and Spanish, all non-sitters. They again embrace several varieties which are described as follows:—

White Leghorns.—(See Plate 3, No. 5.)—One of the best known and popular varieties of the Leghorn family. They are prolific egg-layers, as indeed are all females of the Leghorn group. There are no standard weights for Leghorns, Andalusians or Spanish fowls. Eggs are white in colour and of medium size, some strains laying eggs of large size. Chickens are hardy and make rapid growth.

Brown Leghorns.—Another popular variety with many admirers. They possess all the merits of the white variety, but their eggs are slightly smaller. Colour of egg, white. Chickens hardy and rapid growers.

Buff Leghorns.—A comparatively new, but popular variety. Eggs large and white in colour. Chickens hardy and quick growers.

There are rose comb varieties of the white and brown.

Other varieties of the Leghorn family are *Black Dominique* and *Silver Duckwing*. Neither of these varieties are as well known as the three first mentioned. All varieties of the Leghorn breed are non-setters.

Black Minorcas.—(See Plate 3, No. 6.)—A well known and much appreciated variety. They have to a great extent taken the place of the Black Spanish, because they are larger, heavier and hardier. The hens lay large eggs, many of them weighing 6 to one pound and most of them 7 to a pound. The chickens are hardy and make vigorous growth. Colour of eggs, white. Non-setters. The standard gives Minorcas the following weights:—

Cock	Lb. 8
Cockerel	6½
Hen	6½
Pullet	5½

White Minorcas.—Are not to be found in such numbers as the black variety. Eggs large and white in colour. Excellent layers. Weights same as the black variety. Non-setters.

Andalusians.—At times called Blue Spanish. A well known and popular variety of the Spanish family. A good layer of large white eggs. Like Leghorns and Minorcas when properly fed, cared for and housed, they have proved themselves fairly good winter layers. Chickens are hardy and grow well. They do not always breed true to the light blue slaty colour called for, and for that reason a number of chicks may be necessary to make up a full pen of the colour required by the standard. They are non-setters. They are not given weights by the standard.

FRENCH GROUP.

The French group consists of several breeds the best known of which are as follows:—

Houdans.—Crested fowls of mottled colour: They are non-setters, are good layers and plump in body and white in colour of flesh. The two latter qualifications coupled with a small frame go to make them a capital table fowl. As capons they are very acceptable on the French markets. They are great foragers and do best when they have range. The crest on the heads of the chicks, it is said, causes them to fall an easy prey to hawks. In this respect, however, they are no worse than Polish fowls. Chickens are hardy and grow well and fast. The standard weights are:—

Cock	Lb. 7
Cockerel	6
Hen	6
Pullet	5

La Fleche.—These fowls are not in great number throughout the country. They are to be seen at the larger shows. Their standard weights are :—

Cock	Lb.
Cockerel	8½
Hen	7½
Pullet	7½
	6½

Crevecoeurs.—These are comparatively unknown throughout this country although having a place in the American Standard. Their weights are :—

Cock	Lb.
Cockerel	8
Hen	7
Pullet	7
	6

Faverolles.—(See plate, 4 No. 7.) The Salmon (*Saumon*) variety is best known in this country, but as yet they are held by comparatively few persons. They are, however, steadily gaining ground. The merit of the Faverolle is that of a table fowl of small bone and fine quality of flesh. They are also fairly good layers of eggs of medium size. Mr. T. H. Robinson, the English Faverolle breeder, says of them :—‘that they will attain a size and weight with less trouble than some of our finer breeds, and a young fowl of this variety will leave nothing in the way of quality to be desired.’ The chickens make quick growth and are hardy.

HAMBURGH GROUP.

The Hamburg group embraces three breeds, viz. :—Hamburgs, Redcaps and Campines. These are again subdivided into eight varieties, six belonging to the Hamburgs, two to the Campines, the Redcaps being without a variety. The different varieties are :—

Black Hamburgs.—(See plate 4, No. 8.) Compact, small, tightly feathered birds with lustrous black plumage. They are good layers of white eggs slightly over the medium size.

Other varieties are :—Golden Spangled, Silver Spangled, Golden Pencilled, Silver Pencilled and White. All are excellent layers, but their eggs are of small size.

Redcaps, Golden and Silver Campines.—Are held by comparatively few breeders and are really unknown among the farming community. The Redcaps seem to be losing rather than gaining ground. Campines are birds of handsome appearance, medium size and good layers.

ENGLISH GROUP.

The English group of fowls may be said to embrace many different kinds, and for the most part they have been valued for their egg laying and table qualities. As with the American breeds, the aim seems to have been a combination of egg laying and market types with small frame and superior quality of flesh. In this respect the English and French breeds may be said to be unexcelled. Both nations are also skilled in crossing varieties, with the aim of producing flesh with small frames and a fine quality of meat of white colour.

Some American varieties, notably *Silver Laced Wyandottes*, have been so skilfully handled by the English breeders as to much improve them in size and markings. Some of the best known English breeds and their varieties are noted as follows :—

Coloured Dorkings.—Are well known in this country and have many friends. They are famous—as all the Dorking varieties are—for their table qualities. For many years Dorkings or their crosses have held first place in England and France as market types. The coloured variety in Canada has been found—when acclimatised—a most useful one. Their bodies are long, broad and deep; legs short and of flesh colours. They have five toes on each foot, and so have many of their crosses. The female.

are fairly good layers of eggs of medium size, As with other varieties of fowls, some strains are much better layers of large eggs than others. Their standard weights are :—

Cock.....	Lb.
Cockerel.....	8
Hen.....	7
Pullet.....	6½
	5½

Silver Grey Dorkings.—(See plate 5, No. 9.)—These are very much the same as the coloured variety, the difference being in plumage and not in utility points. They have proved unusually good winter layers and market fowls in the hands of certain breeders. Some strains have shown symptoms of tenderness, but the eradication of this weakness is only a matter of careful manipulation and time. Weights, the same as in the first-named variety.

White Dorkings.—This variety is not so well known as the two preceding ones, but it is not without merit as an egg layer and table fowl. The fowls differ from the others in having rose instead of singled combs. They also slightly differ in weights, which are :—

Cock.....	Lb.
Cockerel.....	7½
Hen.....	6½
Pullet.....	6
	5

Buff Orpingtons.—(See plate 5, No. 10.)—Buff Orpingtons are one of many varieties of the Orpington family. They are comparatively new comers, but have taken a front place in the utility poultry ranks as winter layers and market fowls. There is great demand for eggs and fowls. They have light coloured legs and white flesh. Chickens are healthy and hardy. Eggs are of medium, or, larger size, according to strain. Canadian Buff Orpington Club accords them the following weights :—

Cock.....	Lb.
Cockerel.....	9
Hen.....	7½
Pullet.....	7
	6

White Orpingtons.—Are a most promising variety, and are likely to become popular on account of their merits as layers and table fowls. They are not yet well known, but will soon make many friends. Their characteristics are about the same as those of the buff variety, with the exception of the colour of the plumage, which is pure white.

Jubilee, Spangled and Rose Comb Buff and White Orpingtons.—Are varieties of the same family, which are yet in few hands. All claim more or less merit. The buff and white varieties are likely to be first in favour of fanciers and breeders for some time to come, as they are best known and have certainly made a favourable impression.

Among the English breeds may be classed the numerous family of Games, which are to be found in all parts of the Dominion. They are principally held for show purposes, but occasionally are used for crossing with other varieties. As a commercial fowl they are not much known. Of the Game family, the Cornish Indian variety is the best liked for market and for crossing with.

RATIONS AND MANNER OF FEEDING THEM.

In the composition of rations suitable to the different seasons of the year, farmer should find ample opportunity to utilize much of the waste of their farms. As a means to this end the mash (composed principally of ground grains) affords opportunity to use the waste of table, kitchen and barn, as is hereafter shown. By some authorities the

use of the mash is condemned as likely to make the layers over-fat and their eggs in early spring time unfertile. Experience has shown that an over-fat condition is generally the result of over feeding of hard as well as ground grains. Over feeding of any description of food is undesirable. The aim of the poultry keeper should certainly be to have an effective as well as cheap ration, but experience has shown that the cheapest ration is not always the best winter egg producer. The cheapest ration has been found to be the one which will bring the greatest number of eggs when they are worth most. As to the quantity of food which should be given, that depends upon whether the fowls are kept in warmed or cold houses, the latter in recent years being more popular especially when associated with scratching shed attachment, plans of which are shown in Part II of this bulletin. Experience has unmistakably made plain that fowls in the cold houses require more food to incite egg production than those in the warmer premises. Attempts have been made to show that such is not the case, but long experience and close observation lead to the conclusion that the colder the temperature of the house a greater quantity of food is necessary to produce the egg. Observation has also shown, in the case of fowls kept in cold houses, that it was the surplus quantity of food over and above that required for the sustenance of animal heat that went into the product. There is reason to conclude that the mistake is not unfrequently made of giving fowls in cold winter quarters food sufficient to keep up the animal heat, but not enough in addition to promote egg-laying. Hence the enquiry occasionally made by correspondents, "what can be the matter with my hens. They look well, are apparently in good condition, and yet do not lay?" It was also made evident by the results of past years that rations of a varied nature, when fed in liberal rather than stinted quantities, not only resulted in a larger egg yield, but the germs of the early spring eggs were strong and produced strong chickens. Were results similar in the case of the fowls kept in artificially warmed premises? Certainly not to the same extent. The fowls in the partially warmed houses laid fairly well during the winter season, but the germs in the eggs laid by them in early spring were weak, did not hatch well, and the chickens which were hatched from them in too many instances were weaklings. As shown in reports of the past three years, the germs of these eggs remained weak until the fowls ran outside and recuperated from their long term of artificial life and treatment. This has usually been about the 12th of April.

In the case of the fowls kept in cold premises, it seemed as if the feeding of the varied rations in generous quantity—in combination with fresh air—not only proved incentives to egg production, but kept the vitality of the laying stock so unimpaired as to permit of both a satisfactory egg yield during the winter months and in early Spring strong germs which developed into robust chickens. As a means to this end Ration No. 1 is recommended. Other rations follow.

RATION No. 1.

The composition of this ration permits of the utilization of the waste of table and kitchen. The waste is distinguished as follows:—

TABLE WASTE.—What is left of porridge, potatoes and other cooked vegetables, scraps of meat, bread, &c., but no salt or fat substances.

KITCHEN WASTE.—Potato, turnip and other vegetable peelings, &c., which should be cooked. In the pot in which these are boiled a surplus quantity of hot water should be left into which the table and kitchen waste and such ground grain, or, grains as are most convenient should be thrown.

The whole should then be thoroughly mixed in proportion of one half waste and one half ground grains, or, thereabout, into a crumbly condition. When cool it may be fed morning and afternoon in quantity of two pounds to 15 hens, the latter presumably being under two years of age, as this class of food has been found most suitable to fowls of that age.

NOON.—About 12 ounces of oats should be thrown into each pen of 15 fowls so that the latter may be kept in exercise searching for the grain in the litter on the floor. Cabbage, or roots, such as mangels, turnips, &c., should be regularly supplied.

AFTERNOON RATION.—Should the mash be fed in the morning, whole wheat about $1\frac{1}{2}$ ozs. to each fowl should be given at this ration and thrown in the litter so as to cause the fowls to exercise in looking for it. Care should be taken that this ration is not fed too late, especially in the winter, and that the layers go to roost with their crops filled.

Grit, to assist in grinding up the hard grain, crushed oyster shells and pure drink water should always be in supply. Vary the rations but feed regularly. If properly made up and fed in quantities as suggested the foregoing ration should embrace variety so necessary and be followed by liberal egg production, good health and the prevention of egg eating and feather pulling. Many of the diseases affecting poultry and the vicious habits practised by them may be traced to want of variety in rations, lack of exercise and to overcrowding.

For several winters past the foregoing rations have been fed with most satisfactory results, but more particularly noticeable were these good results during the winter of 1905 which will doubtless be remembered for its steady and lengthy cold.

The rations were fed to the birds named below under the conditions given as follows:—thirty-five in all of Buff Orpington and B. P. Rock hens of two and three years of age were kept in a rough and cheaply constructed house, part of a shed. During the winter these fowls laid well. On the 3rd or 4th of last April, 14 of their eggs were put under a broody hen—12 of these were Buff Orpingtons and two Barred P. Rocks. The result was 12 Buff Orpington and 1 B. P. Rock chickens, 13 strong and lively chicks. Unfortunately three were crushed to death in the nest, but the remaining 10, after 36 hours, were with the mother hen placed in a coop on the growing grass outside. Despite unusually cold weather the chickens made famous growth not one showing the least sign of weakness.

RATION No. 2.

This ration has been found effective in the production of eggs in winter, for many seasons past, in our department:—

Mash composed of—

Shorts.....	2 parts.
Ground oats.....	1 “
Cornmeal.....	1 “
Meat meal.....	1 “

The whole mixed into a crumbly condition with boiling water. Occasionally ground barley took the place of the ground oats and gluten meal that of the cornmeal. This mash, the ingredients of which had been well mixed, was fed in the proportion of one quart, imperial measure, weighed dry to 15 hens 3 times per week at morning, noon, or afternoon on different periods.

11 A.M.—Steamed lawn clippings twice per week. If fed in too great quantity, too frequently or not cut short the lawn clippings were found to make the hens crop bound.

AT NOON.—Five pounds of oats to every 100 hens thrown into the litter on the floor will keep the birds in exercise.

Three times per week cut green bones were given, in lieu of the oats, in proportion of one pound to every 15 or 16 hens.

AFTERNOON RATION.—Ten to 12 lbs. of wheat to every 100 hens which was thrown into the straw, or, chaff on the floor. If the layers seemed to want more grain, it was given to them.

Mangels were the most convenient roots and were always in supply. So were grit, crushed oyster shells and pure drink water.

RATION No. 3.

MORNING.—A mash of ground grains such as the farmer has in the most abundance mixed with potatoes, turnips or carrots, boiled, in proportion of three quarters

grain to one quarter vegetables. Occasionally, instead of the boiled roots or potatoes, variety may be had by mixing with the mash steamed clover hay, cut into short pieces. Feed three mornings or afternoons of the week in proportion as given in No. 2. When mash is not fed in the morning whole grain should be given.

NOON.—A few handfuls of oats 4 or 5 lbs. to 100 fowls to keep them in exercise. Cut bone may be given at this time, 3 times per week in lieu of the grain and in proportion of one pound to 15 fowls.

AFTERNOON.—Wheat is the best grain to feed at this time, and should be given before it is too dark for the fowls to see to search for it in the litter. It should be given in quantity of about two pounds to 15 layers, so as to send them to roost with full crops. If mash is occasionally given at this time, a good plan, after feeding, is to throw a few handfuls of grain in the litter so that the fowls can have it by looking for it.

RATION No. 4.

The following ration has been attended with satisfactory results in egg production and health of stock. It is recommended for pullets :—

Ground oats	2 parts.
Shorts	1 "
Cornmeal	1 "
Meat meal	1 "

When cut bone is fed the animal meal should be omitted. The mash should be mixed with boiling water and fed every morning or afternoon in proportion of two ounces to each layer. Dust into the grains, before the hot water is poured on them, half a teaspoonful of black pepper and about the same quantity of salt. Vary by mixing in, occasionally, boiled turnips, carrots or cabbage.

NOON.—Oats, or equal parts of buckwheat and oats mixed, in proportion of 4 lbs. to 100 hens. Roots, in the shape of mangels, turnips, &c., with grit, crushed oyster shell and pure drink water are supposed to be regularly supplied.

AFTERNOON.—When mash is not fed give one pound and a-half of wheat to every 12 pullets or 15 older hens. Cut bone should take the place of the noon ration 3 times per week, in proportion of 1 pound to 15 or 16 birds.

RATION No. 5.

The following ration is recommended for winter egg production by a farmer in the Eastern Townships who has the scratching shed attachments to his poultry houses, containing 80 fowls :—

MORNING.—Mash composed of cut clover, potatoes or turnips all boiled together and rounded up firm with wheat or other ground grain. Fed warm during winter.

NOON.—Grain thrown in the litter on the floor of the scratching sheds. We do this to make the hens search for the grain and so obtain exercise.

AFTERNOON.—A good feed of grain so as to send the birds to roost with their crops full.

We supplied green food in the shape of small apples or turnips. Grit, lime and pure water were before the layers all the time. Strict accounts of receipts and expenses were kept. We sold eggs in Montreal during winter at 40 to 45 cents per dozen, and in summer at 15 cents. Chickens at 58 to 64 cents per pair. Our fowls are pure bred. I do not believe in mongrels. The eighty fowls made us last year \$219; the cost of keep for that period was \$69.35, leaving a balance of \$149.65 to the good. A good deal of this success is due to the help I received from my wife."

RATION No. 6.

The following ration for use in cold poultry houses with scratching shed attachment as recommended by Mr. James Shackleton in his work entitled, 'System in Poultry

PLATE I.



NO. 1.—BARRED PLYMOUTH ROCKS.

NO. 2.—WHITE PLYMOUTH ROCKS.

Photo. by F. T. Shutt.

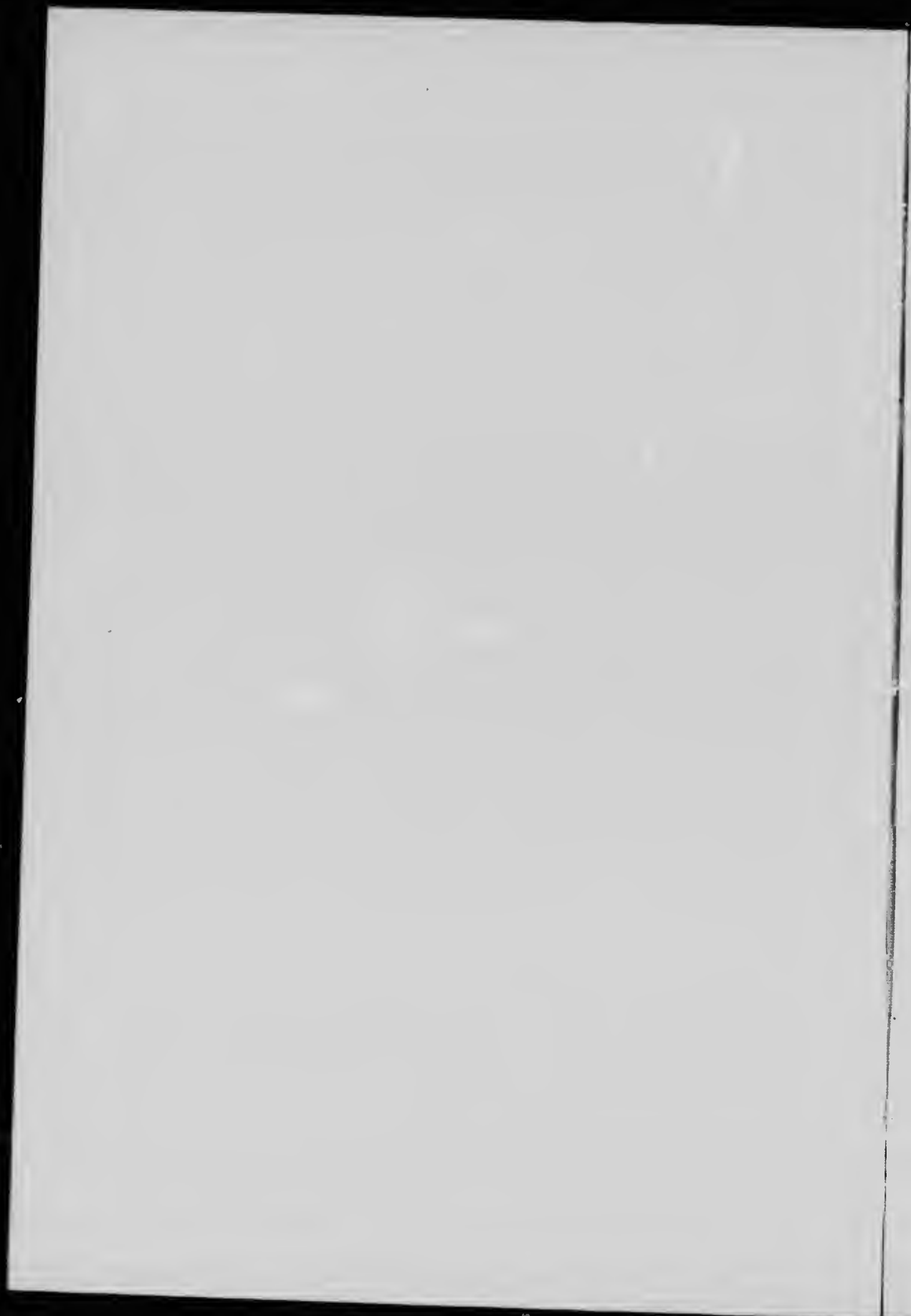


PLATE II.



No. 3.—WHITE WYANDOTTES.

No. 4.—LIGHT BRAHMAS.

Photo. by E. T. Shatt.

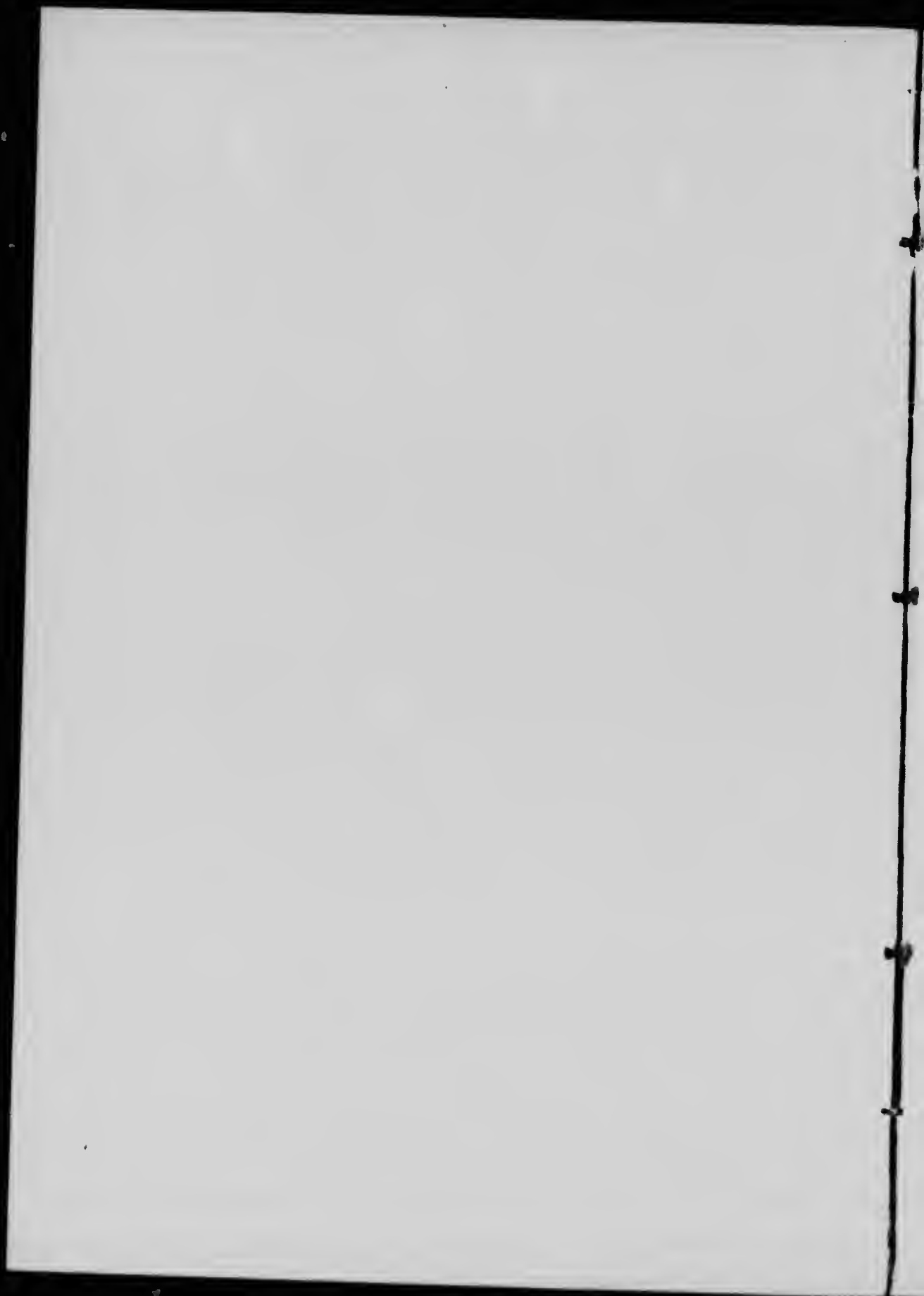


PLATE III.

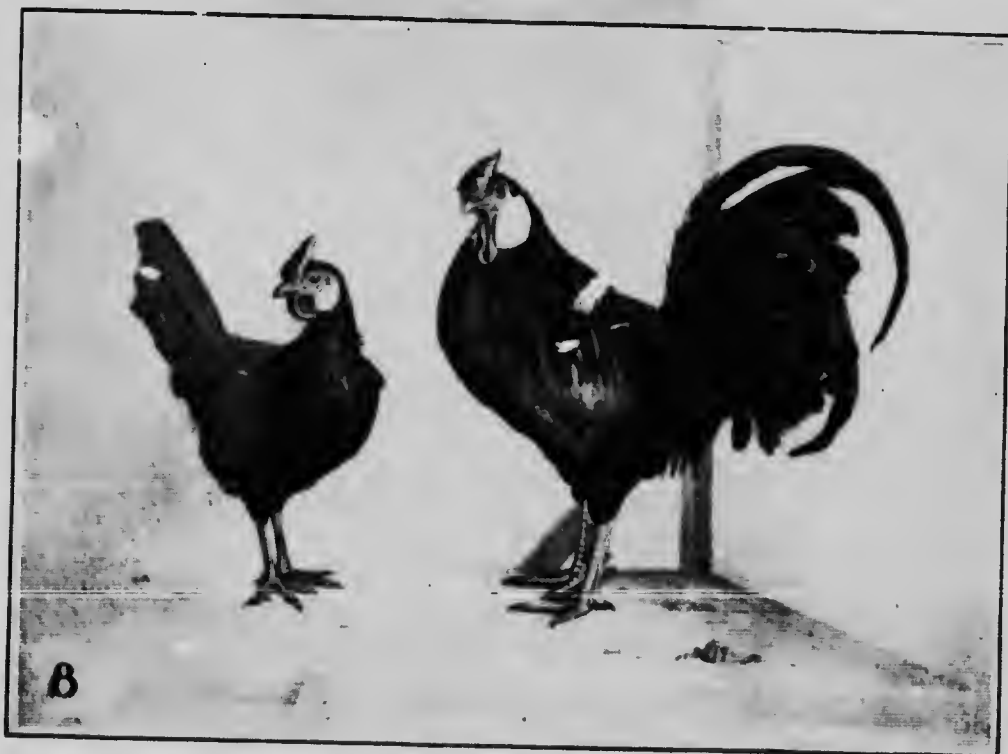


NO. 5.—WHITE LEGHORNS.

NO. 6.—BLACK MINORCAS.

Photo. by F. T. Shutt.





No. 7.—FAVEROLLES.

No. 8.—BLACK HAMBURGS.

Photo. by F. T. Shutt.





No. 9.—SILVER GREY DORKINGS.

No. 10.—BUFF ORPINGTONS.

Photo. by F. T. Shutt.



Practice.' It is calculated for twenty-five birds of the Plymouth Rock or Wyandotte family, twenty-two Brahmas or twenty-one Leghorns:—

Morning meal, 3 lbs. wheat (whole); noon meal, 1 lb. oats (whole); afternoon meal, mash, 5 lbs., composed of ground grain and mixed with boiling water and fed when cool.

RATION No. 7.

The following ration was fed during last winter to twelve hens and one cock which were located in pen No. 1 of No. 1 poultry house. The temperature of the building varied from below freezing at night to 35 and 40 degrees during the day.

Grain.—For 12 hens and one cock one and a half pounds per day, composed of half oats and half wheat. Of this three-quarters of a pound was fed in morning ration and three-quarters of a pound in the evening ration.

Mash.—Fed in quantity of three-quarters of a pound every three days at noon, composed of two parts shorts, one part ground oats, 1 part ground barley.

Cut bone, twelve ounces every three days; beets, twelve ounces every three days; grit, ground oyster shells, drink water regularly supplied.

RATION No. 8.

Used last winter in No. 3 poultry house the temperature of which was similar to that of No. 1.

Grain.—For 10 hens one and a quarter pounds per day composed of one-half oats and one-half buckwheat, fed in quantity of ten ounces in the morning and ten ounces in the evening.

Mash.—Of same composition as No. 1. Quantity fed—three-quarters of a pound in the morning and three-quarters of a pound in the evening.

Cut bone, ten ounces every three days; beets, ten ounces every three days, grit, ground oyster shells, &c., in regular supply.

RATION No. 9.

The following ration was given last winter to 24 hens which were kept in a newly-erected poultry house with scratching-shed attachment. There was no artificial heat.

From Nov. 1 to Dec. 15, 1904:—

Grain.— $\frac{1}{2}$ wheat, $\frac{1}{2}$ buckwheat, $\frac{1}{2}$ oats. Three to 5 lbs. per day.

Mash.—Same as No. 7, $1\frac{1}{2}$ lbs every 3 days.

Cut-bone.— $1\frac{1}{2}$ lbs. every 3 days.

Beets.— $1\frac{1}{2}$ lbs. every three days.

From Dec. 16, 1904, to March 10, 1905:—

Grain.—5 to 6 lbs. per day.

Mash.—2 lbs. every 3 days.

Cut-bone.— $1\frac{1}{2}$ lbs. every 3 days.

Beets.—1 lb. every 3 days. When beets were given another pound of cut-bone was also fed.

From March 11 to warm weather:—

Grain.—3 to 5 lbs. daily.

Mash.— $1\frac{1}{2}$ lbs. daily. (Hens running at large.)

In April the cut-bone was replaced by one-fifth of meat meal, which was added to the mash. In warm weather there was a difficulty in keeping the cut green bones.

Meat meal was found a convenient means of replacing it. It will be seen from the above that the quantity of rations fed were more or less according to the temperatures of the seasons.

QUANTITIES OF RATIONS REQUIRED.

Experience has shown that the exact quantity of ration needed depends partly upon the age of the fowls and partly upon the temperature of the house in which the fowls are kept. Pullets in moderately warmed houses, with a temperature of 40 to 45 degrees, have been found to lay well and keep in good health on a quantity of food which, if it had been given to hens of two years of age in the same temperature, would have made them overfat. Again, two and even three year old hens have been found to lay well in a cold house, and not only keep healthy but the germs of the eggs laid by them, in early spring, were strong and hatched strong chickens, on a quantity of food which, if it had been given to hens of similar age, in a warmed house, would have resulted in disaster. In his work entitled, 'Poultry for the People,' Mr. Alex. Comyns, the late editor of 'Feathered World,' of London, Eng., on the subject of feeding exact quantities to poultry says: 'Where the idea of feeding fowls by weight originated I hardly know. A hen requires different amounts of food according to her size, her circumstances as to locality, temperature, &c., her condition, as to whether she is laying or moulting; and yet poultry keepers are anxious to lay down a hard and fast line as to the amount of food to be given her. The only rule as to quantity which can be followed with advantage is to give as much of the proper kind of food as the birds will eat greedily without waste and without growing unduly fat.'

While there is doubtless difficulty in determining exact quantities to feed, yet close observation during many years on the part of the writer and many other poultry keepers, has led to conclusions as to weights and measures which when practiced have proved effective. Some of these are summarized as follows:—

ESTIMATED QUANTITIES.

Mash.—2 ozs. to each fowl per day.

Grain.—4 " " "

Cut bone, boiled beef heads or meat. One pound to 15 layers three times per week.

Meat-meal and beef scraps, at such times as cut bone is not fed, 2 ozs. per fowl. Meat-meal is generally mixed in the mash. Beef scraps are most frequently given alone and occasionally in the mash.

Green Stuff.—In shape of lawn clippings, clover hay, &c. The former should be cut short, steamed and given alone in moderate quantity twice or thrice per week. Clover hay also cut short and steamed is generally used in the mash in proportion of one-fourth of its weight. It may be given alone, steamed or dry, where vegetables or roots are scarce.

Roots or Vegetables.—The latter, if in the shape of cabbage, should be hung two feet from the floor of the pens, so as to incite the hens to exercise by jumping for it. Cabbage is also used in the mash when boiled. Roots, such as mangels, turnips, &c., should be in supply at all times.

Grit for grinding up hard food in the gizzard and ground oyster shells to make time for shell and pure water should constantly be furnished the layers. The attention to these details are all important.

There may be, and doubtless are, forms of waste not mentioned here, to be found on farms throughout the country and, which, if clean and wholesome, may be used to good purpose.

CERTAIN CONCLUSIONS.

The feed of rations in composition and manner as outlined has shown:—

1. That *ty* in composition of rations is necessary to complete success. Times of feeding should be regular.

2. That where there has been variety as outlined in rations there has been neither egg eating nor feather picking.

3. That where varied rations were fed during the winter season to fowls—even two and three years of age—and which were kept in cold houses, resulted in satisfactory egg laying, with strong germs and robust chickens in early spring.

4. That the long continued feeding of an unvaried ration is apt to lead to diseased conditions.

In connection with the feeding of rations it has been advised by some authorities to lessen the quantity of the winter rations as the spring season opened. Others contend that such can only be done at expense of vitality, fertility of eggs, strength of germ and size of egg. With the latter view, the experience of many years leads the writer to agree.

In spring time there is certainly an increased number of eggs laid, and most likely, in many cases, by hens which have laid previously but few eggs, or, it may be none at all, but notwithstanding it was not found desirable to lessen the quantity of food. When the breeding season is over and such hens as are not under experiment are allowed to run at large, rations have been reduced but with the object of bringing on the moult.

THE MOULTING PERIOD.

In order to have early and steady winter layers it is necessary that the fowls should moult during the late summer months. The moulting period has hitherto been regarded as a season of non-production. It occurs once every year and means the shedding of the old feathers and the growth of new ones. The time of moulting has usually been from 10 to 12 weeks, but by careful treatment and the feeding of suitable rations the period has been shortened. As much enquiry is made from time to time as to how to bring on an early moult, the following plan of management, which has been successfully practiced in our department for many years, is outlined:—

The sale of eggs for breeding purposes being over by the end of June, during the first week in July the male birds were removed from the breeding pens to another building containing small compartments with outside runs. The breeding stock as well as all other hens were then allowed to run promiscuously in the field in the rear of the poultry buildings, where there was grass, clover and shade, three important essentials. At this time the rations were reduced to half quantity. The effect of this was immediately to very much reduce and ultimately to almost entirely stop egg production, which was the desideratum. The half rations were continued for two weeks, when full quantity was resumed as follows:—

Mash composed of coarsely ground oats two parts; shorts one part; gluten meal one part with beef scraps in proportion of one pound to 15 fowls. The mash, which in summer was mixed with cold water, was fed three times per week. At times a small quantity of linseed meal was added. The beef scraps were used in lieu of cut green bones, because it was not convenient to procure the latter. If mash was fed in the morning, wheat or oats, or both mixed, were given in the afternoon, or *vice versa*. On such days as mash was not given grain took its place.

Dr. Sanborn, a well known authority on poultry management, says in regard to the moulting period: "A moulting hen is easily fattened. Hence at this period feed lightly of those foods which produce fat. Corn, corn meal, middlings, potatoes, must be used sparingly. Increase the amount of green bone, bran and skim milk, a run in a field of clover will be a help. Keep all males by themselves during the moulting period. Shelter the hens from storms or cold rains. The ideal place for a run is an apple orchard where in addition to the grass may be found insects in the fallen fruits, &c. Birds should go into the moult not fat, free from lice and with no mites in the house."

A correspondent in Nova Scotia writes that he has reduced the moulting period by feeding, in generous quantity, beef heads boiled, broken into small pieces and put

through his bone cutter. As a result of this treatment there was hardly any cessation of laying. The experience of many years has shown :—

1. That yearling hens usually moult earlier and easier than older ones.
2. That moulting is more gradual in some cases than others.
3. That the progeny from parent stock which have moulted during summer, in the majority of cases, have usually moulted at the same period.
4. That moulting hens are much benefited by a run in a field where clover, grass and insect life may be found.
5. That where moulting fowls are confined to limited runs, that meat in some form and green food should be regarly supplied.

HOW MANY CHICKENS SHOULD A FARMER BE ABLE TO CONVENIENTLY HATCH AND REAR ?

In a previous page the farmer is advised to handle no more than 150 chickens, as an attempt to hatch and rear a greater number might overtax his time and energy. It is obviously waste of chicken life for a farmer to hatch out more chickens than he can successfully rear to marketable, or, laying age. In report of 1900 it is pointed out that the most suitable time for the great majority of farmers to hatch out their chickens is in late April or the first week in May, for the reason that unless provided with incubator room and brooding house—so as to be independent of outside temperatures—it would be inconvenient if not impossible for him to raise chickens, in paying numbers, at an earlier season. Experience and expressions of opinions from farmers strengthen that statement. Experience has also shown that the May hatched pullet will likely begin to lay in November and continue to do so all winter, while, pullets, hatched in earlier months are liable to moult and remain non-productive when eggs are at their highest value. The early May pullet is obviously the most suitable bird for the farmer. His chickens whether hen, or, brooder reared are likely to make more rapid progress at this time than any other for they literally seem to grow with the grass. As to the best means of hatching and rearing chickens farmers are rapidly finding out that if they desire to have early May chickens of uniform age and number that artificial means are necessary. There is no intention to belittle the hen as a hatching medium. She will doubtless be the favorite means of incubation with many persons, but where 150 chickens are wanted at one time and in the first week in May, a larger number of hens, than are usually obtainable in the second week in April, would be required to bring about such results. Mrs. Joseph Yuill, of the township of Ramsay, near Carleton Place, an experienced and successful poultry raiser, stated in an address given before the members of the Ottawa Poultry Association in October of last year 'that during the previous spring she had hatched by means of her incubator 101 chicks from 105 tested eggs.' Experience of many years has shown that chickens hatched in the last week of April, or, the first one in May, are the easiest to rear and consequently the most suitable for the farmer.

LICE AND DISEASE GERM EXTERMINATOR.

A remedy for lice infested premises and disease germs is frequently asked for. The following will be found effective :

Corrosive sublimate.....	4 ounces.
Common salt.....	4 "

Dissolve in two to four quarts of water. When completely dissolved, dilute to 25 gallons.

With this carefully spray every crevice, nook and corner of the house.

As the solution is highly poisonous, care should be observed in handling it.

Follow by whitewashing the premises. Before returning the fowls to the poultry house, see that they are entirely free from vermin.

A SERVICEABLE WHITEWASH.

A durable and lasting whitewash may be made as follows:—Put into a water-tight clean barrel half a bushel of unslaked lime. Slake the lime by pouring sufficient hot water in the barrel to cover the lime to a depth of five inches. Stir briskly until slaked. Add two pounds of sulphate of zinc and two pounds of salt dissolved in hot water. These ingredients will prevent the wash from cracking or peeling off. It is better to apply the whitewash while hot. If to be used for inside of poultry house, colony houses or coops add half an ounce of carbolic acid.

To colour the whitewash add yellow ochre, venetian red, or any other desired color.

THE PRESERVATION OF EGGS.

LIME-WATER—WATER-GLASS—THE GLYCERINE PROCESS.

By FRANK T. SHUTT, M.A., *Chemist, Dominion Experimental Farms.*

Experiments in egg preservation were begun at the Experimental Farm, Ottawa, in 1898, and have been continued every season since that date. In the course of these experiments, trials have been made with more than twenty-five different fluids and preparations that have been proposed or sold as egg preservatives. The work of these seven years has shown conclusively the superiority of lime-water over all the preservatives which we have tested.

THE PREPARATION OF LIME-WATER.

The solubility of lime at ordinary temperatures is 1 part in 700 parts of water. Such a solution would be termed saturated lime-water. Translated into pounds and gallons, this means 1 lb. of lime is sufficient to saturate 70 gallons of water. However, owing to impurities in commercial lime, it is well to use more than is called for in this statement. It may not, however, be necessary, if good, freshly burnt quicklime can be obtained, to employ as much as was at first recommended, namely, 2 to 3 lbs. to 5 gallons of water. With such lime as is here referred to one could rest assured that 1 lb. to 5 gallons (50 lbs.) would be ample, and that the resulting lime-water would be thoroughly saturated. The method of preparation is simply to slake the lime with a small quantity of water and then stir the milk of lime so formed into 5 gallons of water. After the mixture has been kept well stirred for a few hours it is allowed to settle. The supernatant liquid, which is now 'saturated' lime-water, is drawn off and poured over the eggs, previously placed in a crock or water-tight barrel.

As exposure to the air tends to precipitate the lime (as carbonate), and thus to weaken the solution, the vessel containing the eggs should be kept covered. The air may be excluded by a covering of sweet oil, or by sacking upon which a paste of lime is spread. If after a time there is any noticeable precipitation of the lime, the lime-water should be drawn or siphoned off and replaced with a further quantity newly prepared.

GENERAL PRECAUTIONS NECESSARY TO TAKE.

It is essential that attention be paid to the following points:—

1. That perfectly fresh eggs only be used.
2. That the eggs should throughout the whole period of preservation be completely immersed.

Although not necessary to the preservation of the eggs in a sound condition, a temperature of 40° F. to 45° F. will no doubt materially assist towards retaining good flavour, or rather in arresting that 'stale' flavour so often characteristic of packed eggs.

Respecting the addition of salt, it must be stated that our experiments—conducted now throughout five seasons—do not show any benefit to be derived therefrom; indeed, salt frequently imparts a limey flavour to the egg, probably by inducing an interchange of the fluids within and without the egg. Our advice is, do not add any salt to the lime-water.

WATER-GLASS AS A PRESERVATIVE.

Water-glass (sodium silicate) has been extensively experimented with, using solutions varying from two to ten per cent. On the whole, solutions two to 5 per cent. (two pounds to five pounds sodium silicate in ten gallons of water) have given better results than stronger solutions. Although in the main the results have been very fairly satisfactory, we are of the opinion that lime-water is superior as a preservative. Further, lime-water is cheaper and pleasanter to use than water-glass solution.

THE GLYCERINE PROCESS FOR THE TREATMENT OF EGGS.

This is apparently a misnomer, as glycerine, so far as the writer can learn, is not used in the process, which consists of momentarily (say about five seconds) dipping the eggs (which have been "pickled" in lime-water) in dilute muriatic acid, between one and two per cent. This acid dissolves any incrustation on the shell and gives the eggs a fresh appearance, i.e., as if they had been treated with glycerine. Immediately on withdrawing the eggs from the acid they are well washed with water, as by a hose, to prevent further action of the acid and dried. This immersion in acid lessens the tendency of shell cracking when the pickled egg is boiled. Eggs should not be subjected to this treatment till about to be used, since the keeping quality of the egg is materially affected by the process.

The addition of glycerine to various egg preservative fluids has been tried at the Experimental Farm, but in no case did it prove satisfactory. The general effect was to induce the growth of mould.

TURKEYS.

THE DIFFERENT VARIETIES—THE BEST VARIETY FOR THE FARMERS.

HOW TO REAR, KILL, PLUCK, DRESS AND PACK.

There is doubtless money in turkeys to the farmers of the country. Climatic conditions in the greater part of Canada are favourable to turkey breeding. The Rev. John L. Simpson writing from the neighbourhood of Calgary says, 'This is an ideal district for the raising of turkeys, indeed for all kinds of poultry.' The writer when in the southern part of Alberta some years ago, came to the same conclusion. Other parts of the Dominion, are equally favourable. There are six varieties of turkeys, viz.: Bronze, Narragansett, White, Black, Buff and Slate. Of these the Bronze are the largest, heaviest and most popular. The standard weights of this variety are:

Cock.....	36 lbs.
Hen.....	20 "
Cockerel....	25 "
Pullet.....	16 "

HOW TO MATE AND BREED.

To be successful in turkey raising, it is imperative that the breeding stock should be strong and vigorous. Inbreeding should be carefully avoided. Speaking of deterioration through the too common practice of inbreeding, The U. S. Farmers' Bulletin No. 200 on turkey raising says, 'the fact that one fecundation is sufficient to render fertile all the eggs of one laying, has made possible the undermining of the health and vigour of the present day domestic turkey. Being advised of this, hundreds of people depend upon their neighbours' flocks for the services of a male, and pay no attention to the matter of breeding stock, except to keep one or two turkey hens.' Again, the same authority says :—

'Avoid close breeding. New blood is of vital importance to turkeys. Better send a thousand miles for a new male than to risk the chances of inbreeding. Secure one in the fall so as to be assured of his health and vigour prior to the breeding season.'

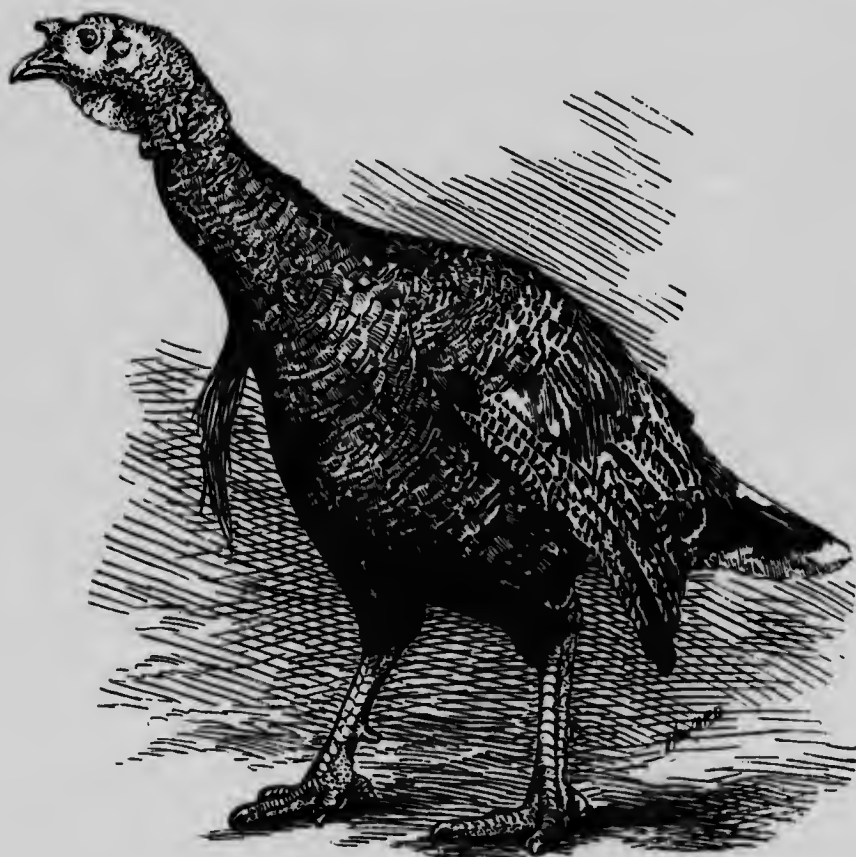


FIG II—BRONZE TURKEY.

It is admissible to use a good male two years, but not to use a young male and pullets of the same family. Young hens weighing 15 to 18 pounds, and older ones of 18 to 20 pounds weight are the best layers and mothers.

One male with 6 or 8 hens is a good mating.

Some turkeys lay more eggs than others. A satisfactory egg yield from each hen is 18 or 24 eggs. The first seven eggs are sometimes given to a common hen, but the turkey, when she has laid her full quota, is the best hatching medium. An objection to the common hen is that she is apt to drag the young poults about too much. Twenty-five young birds are all that the mother turkey can keep dry and warm.

It is of first importance that the young birds should be kept in dry quarters. Too early setting is not advisable in this latitude. It is different where the temperature is milder in winter and spring earlier.

Great care is necessary in rearing the young birds until they 'shoot the red,' (get wattles, &c.) Young turkeys before 'shooting the red' are very tender, afterwards very hardy.

AFTER HATCHING.

After hatching the youngsters and their mother should be put in dry, comfortable quarters. The coop should be roomy, and so situated that mother and brood can easily be driven into it in case of rain. If possible let the young birds have a grass run. Care should be taken that mother and brood are not allowed on the grass while wet with dew. It will be found beneficial to remember this. Experienced breeders have traced the cause of death of many young birds, in their neighbourhood, to damp quarters, lice and indigestion, the latter doubtless caused by eating uncooked food. Unclean, carelessly mixed and uncooked rations have been the cause of death of many young birds. The mortality among young turkeys, every season, throughout the country is much greater than it should be, and in many cases may be traced to neglect of the points outlined.

RATIONS FOR YOUNG BIRDS.

For the first few days feed the newly hatched birds on stale bread soaked in milk and squeezed dry. Mix with hard-boiled eggs and onions, both finely chopped. Curd or cheese made from sour milk may also be given.

Later on feed on granulated oatmeal, rolled oats, or a mash made of stale bread, onion tops, oatmeal, cornmeal or middlings, the whole mixed with skim-milk. The milk should be boiled and a little black pepper dusted into it, before putting it into the mash.

For the first five or six weeks feed four times daily. Afterwards three times.

At the time of 'putting on the red,' uncooked food should not be fed. At this period the young birds are likely to eat ravenously, but they should not be allowed to gorge themselves. After becoming fully feathered they require nothing but hard grain.

Turkeys are fond of roaming, and often wander away from headquarters. In this way many are killed by weasels, skunks and other enemies.

A good plan is to feed the hens and their broods grain every evening, and so accustom them to coming home. This, of course, when the young birds have reached the proper age and have range.

TO FATTEN.

Some breeders fatten their birds, intended for home market or shipment, by confining them in an enclosure or house and feeding heavily twice per day, morning and evening. Others allow the birds limited range during the day, feeding them in the morning previous to allowing them out and again in the evening on their return home. An excellent fattening ration has been found to be as follows:—A mash of finely ground oats and milk in the morning and whole grain at night. To the mash may be added boiled vegetables, table scraps, &c., and it is better if mixed with milk. With the proper variety, to commence with, there should be no difficulty in obtaining the desired flesh development.

KILLING.

Birds intended for the British market should be of first quality, and carefully killed either by dislocation of the neck or bleeding at the mouth. But whether for home market or shipment none but birds in good condition should be sold. Previous to

killing the birds should be fasted for 24 hours so as to have the crop and intestines completely empty. If killing by bleeding at the mouth is adopted, it should be done as advised in the case of chickens killed in that way, viz., by the cutting of the roof of the mouth, at base of the brain, with a narrow, sharp knife, lengthways and across. If the roof of the mouth is pierced at the base of the brain, death is said to be instantaneous and painless. Dislocation of the neck is done by many persons in preference to the manner just described. When the neck of the bird has been dislocated the end of the neck should be two inches away from the head. After killing and during plucking the bird should be so held that its head will hang downwards, thus allowing the blood to drain towards and coagulate in the two-inch space between head and neck. The following note from a London, Eng., poultry-buying firm to one of their agents in Australia shows that the killing must be carefully done.

'Having purchased the several consignments of frozen poultry which you have had on show in the exhibition, I have written you our opinion of same. A, the quality very good; B, trussing very good; C, packing well done; D, killing may be capable of being very much improved on, as the necks of the birds are invariably very much discoloured, and appear almost unsaleable through this. I would suggest bleeding at the mouth, and not so much force used in dislocating the neck. I consider there is a good market here for your poultry, if you can send it, say, to arrive in England continuously from January to June.'

PLUCKING AND DRESSING.

This should be done as described in the treatment of chickens.

PACKING.

The Dominion Department of Agriculture gives the following directions for the proper packing of turkeys intended for shipment:—

Every bird should be wrapped neatly in paper, the head with a quantity of thick paper to absorb any blood. The birds should be packed with their backs down and heads to one side.

Twelve to twenty-four birds should be packed in a case. The case should be packed quite full, so as to prevent birds knocking about inside, during transit or in cold storage.

The case recommended is 6 feet long by 20 inches wide, and from 7 to 11 inches deep. Top, bottom and sides are made of half-inch lumber, with a strengthening piece in centre, one-half inch thick.

The cocks and hens should be packed in separate cases.

The weights of the birds and their sex should be marked on the left-hand corner of both ends of the case.

A quantity of clean straw or wood pulp should be put on the bottom of the case and on top of contents, with wrapping paper between the birds and packing material, to prevent any possibility of injury.

SHIPPING BIRDS IN FEATHER.

In shipping birds in feather the following directions should be followed:—

Kill birds by cutting in roof of mouth as described in previous page.

Before being packed the birds should be thoroughly cooled. Pack in air-tight barrels.

In packing the heads of the birds should be on the middle of their backs. The barrels should be marked so as to describe contents.

DUCKS.

There are several breeds of ducks, the best known of which are Pekin, Aylesbury and Rouen. The weights of the males and females of these breeds are as follows:—

	Lbs.
Pekin Drake.....	8
Young Drake.....	7
Aylesbury Drake.....	9
Young Drake.....	9
Rouen Drake.....	9
Young Drake.....	8
Pekin Duck.....	7
Young Duck.....	6
Aylesbury Duck.....	8
Young Duck.....	7
Rouen Duck.....	8
Young Duck.....	7

MATING.

From three to five ducks are allowed to a drake early in the season. Later in the season, when running outside, ten to twelve. The ducks should not be over two years of age.

Ducks lay from 100 to 140 eggs in a season. The eggs take twenty-eight days to hatch. Duck eggs are hatched by hens or ducks. They hatch well by incubator.

RATIONS AND TREATMENT.

Ducks should be a source of profit to farmers who have opportunity to raise them as they grow rapidly and when properly housed are free from disease. The ducklings, when carefully looked after, should be ready for market in ten weeks just before their pin feathers begin to grow.

The following rations have been found successful in rearing ducklings:—

For the first three or four days, mash of cornmeal, a little hard boiled egg chopped fine, ground wheat or oats, or granulated oatmeal, the whole being mixed with boiling milk. The young birds are very fond of cabbage, lettuce or clover, which should be chopped fine and may be mixed in mash. Make mash crumbly. Give skim-milk for drink.

Later on a mash may be made of cornmeal, bran and oatmeal, with chopped green stuff, and mixed with skim-milk boiled.

Feed the young ducks five times per day. Keep them in dry quarters, out of the hot sun, and supply water in limited quantity in shallow dishes, so as to prevent them ducking into it.

After three or four weeks reduce the rations to four per diem. As the ducklings grow the rations may be added to by house-waste, ground bone, beef scraps or cooked meat. Small pieces of charcoal are aids to digestion. A small quantity of sand, say 5 per cent, added to the rations is beneficial.



Fig. 12. Pekin Duck.

FATTENING.

To fatten, feed on ground grain, meal, beef scraps, &c., made into a mash. Barley meal is excellent in the soft food. Nothing should be fed that will give the flesh a bad flavour.

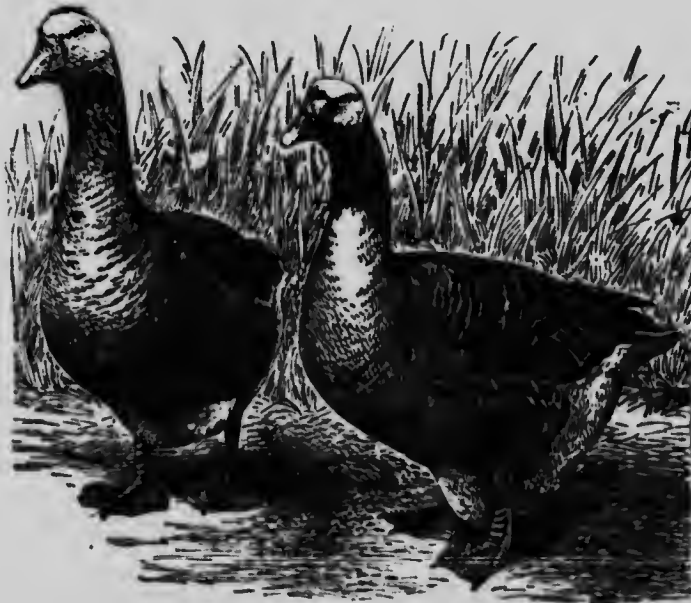
KILLING AND PICKING.

Ducks are best killed by cutting into the base of the brain at roof of the mouth. Before killing, the feet of the bird should be caught in a loop and the latter fastened to a nail with head hanging downwards. The picking, which should commence immediately after killing, requires to be carefully done, so as to prevent injury to the carcass. Duck raising is carried on extensively by many breeders, principally in the United States.

GEESE.

The best known of several breeds of geese are the Toulouse and Embden. The other breeds, five in number, are Gray African, Brown and White Chinese, Gray Wild and Egyptian. The weights of the two first named are :—

	Lb.
Toulouse Gander.....	25
Toulouse Goose	23
Embden Gander.....	25
Embden Goose.....	25
Young Gander	20
Young Goose.....	18
Young Gander.....	20
Young Goose.....	18



No. 13—Toulouse Geese.

Geese are bred in considerable numbers by farmers throughout the country, but not to the extent that they should be taking into consideration their hardy nature and the little care required to bring them on to marketable age, once beyond the gosling stage.

MATING

In mating one gander to two females are used. In some cases three geese are allowed. On the other hand a pair is considered the better mating, as better fertility is secured.

MANAGEMENT.

In spring make large comfortable nests. As a rule two clutches of eggs are laid, sometimes three. The eggs should be collected immediately after they are laid as they are easily chilled. The breeding season generally begins at the commencement of February, sometimes earlier. Geese lay from 12 to 20 eggs before desiring to set. U. S. Farmers' Bulletin 64 says—'As soon as the goose shows an inclination to set, remove her and place her in a dark box or small coop and keep her there for two or three days with water for drink and no food. Then she may be placed back in the yards and she will begin another laying of eggs.'

"The first and second laying of eggs should be placed under hens. After the goose lays the second laying she should be confined again when she will lay a third laying. When she has laid the third laying she should be permitted to set on them. A goose will lay from 10 to 15 eggs in each of the second and third layings. It is recommended that after the eggs have been sat upon for 25 days that they be taken from the nest and be placed for one minute in water heated to a temperature of 104°."

After hatching leave hen and goslings in the nest for 24 hours. After the goslings have become thoroughly dry they should be removed with the mother hen to a coop for 4 or 5 days. At this age the hen may be taken away and the goslings allowed to roam, but they should be cooped up at night.

RATIONS

For first three days.—Similar food as that recommended for ducklings, or the following, by Mr. C. L. Darlington, Lloyd, N.Y.: cornmeal mixed with hard-boiled eggs, chopped fine, a pinch of black pepper and a handful of sand. After three days discontinue the eggs, and give bread soaked in skim or sweet milk, oatmeal, or broken rice boiled until soft, outer leaves of cabbage, onion tops, and all the grass they can eat. Keep the young birds from water, but give it to them in liberal quantities to drink. The same authority recommends as a fattening ration a liberal supply of barley meal and cornmeal, soaked in buttermilk. A grass run is indispensable.

KILLING, PLUCKING AND DRESSING.

For local market, the goslings should be ready in twelve or fourteen weeks, and should be of large size at end of 16 weeks.

They should be killed by bleeding in the roof of the mouth, and all feathers taken off except on wing tips. For shipment and local market the geese are not drawn.

No bird less than nine pounds each should be shipped to the English market. They should be packed ten in a case.

NOTES.

Goose eggs hatch in thirty to thirty-four days.

Some breeders assert that the worth of the feathers from a bird should nearly pay half the cost of its feed for one year.

PART II.

ON INCUBATION, THE REARING AND FATTENING OF CHICKENS AND FOWLS

POULTRY BUILDINGS, &c.

(By VICTOR FORTIER, Assistant Poultry Manager, Central Experimental Farm.)

INCUBATION.

Any practical poultry keeper will find it always to his interest to have the hatching of his chickens take place during March and April, so as to place his produce on the market as true broilers: chickens three months old on the 15th of June. These are a luxury, and they always command a good price.

Pullets for winter laying must be hatched as early as possible, at least never later than the 20th of May.

If it is wished to raise only from fifty to a hundred chickens, an incubator and brooder can be dispensed with and the hatching may be done by hens. But in poultry raising on a large scale, it is quite different. In such a business it will be necessary to place on the market at different seasons of the year many chickens of the same size and same age; and this can be accomplished only by artificial incubation.

With natural incubation, besides the drawback in having a number of hens to watch and attend to, these would stop laying for a whole month; the rearing of their chicks would also involve the sacrifice of about two more months. Altogether nearly three months would be lost for egg laying. This long period will be considerably reduced if the eggs are entrusted to an incubator.

SELECTION OF EGGS FOR HATCHING.—This selection is an essential question; the merit of the hen which has laid the eggs is therefore to be well ascertained. It is as important to know the source of the eggs that are going to be set in the nest or in the incubator, as to know the extent of the milking capacity of the cow whose heifer is in her turn to be kept as a profitable milker. The commercial and practical breeder must give careful attention to the selection of his stock if he is to have eggs suitable for incubation, and in order to succeed in the poultry industry the individual qualities of each hen have to be studied, just as is the case with other farm stock.

When a flock is composed of fifty to a hundred hens or more, each bird cannot be a first-class specimen; if eggs for hatching are taken just as they come, the average of the flock will probably be inferior, for the finest males will have mated with the poorest as well as the best hens.

By practising selection with a small number of good layers, it is easy to keep a flock possessing the best qualities of the particular breed.

Selection may be practised by careful examination of the birds, aided subsequently by trap nests. (See nests, page 30.)

SELECTION OF BREEDING STOCKS BY TRAP NESTS.

In order that the fowls in a poultry plant should make the highest margin of profit, it is necessary that every one of them should be prolific layers. Such layers can only be obtained by careful selection of and breeding from the fowls which show the best egg records in the course of the year. There are two methods of selecting the desirable fowls, viz:—by observation and by means of trap nests. The latter method is preferable, because it is more likely to be accurate. In selection by observation there is always an element of uncertainty. In the case of trap nests results are correct.

HOW THE TRAP NESTS ARE OPERATED.

The fowls to be tested as to their egg-laying qualities having been selected, a leg band bearing a distinguishing number is put on one of the legs of each fowl. One trap nest is usually allowed for every three or four hens. Thus in a pen of fifteen fowls there should be four or five trap nests. After the fowl has laid she is released by an attendant who at once records her egg-laying on a card conveniently placed in the pen. The following shows the form of card used at the Central Experimental Farm :—

CENTRAL EXPERIMENTAL FARM.

POULTRY DIVISION.

Daily Egg Record.

Breed.....

Month... 190....

Hen No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL.

In this manner the history of each hen, good, bad or indifferent, is secured and recorded. The indifferent and bad layers are discarded, and the best layers are used to breed from, and so prolific egg laying strains of fowls are made.

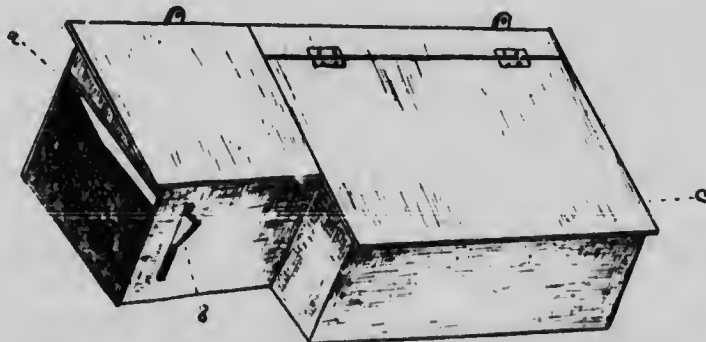


Fig. 14.—The 'Fortier' Trap Nest, in use at Central Experimental Farm, Ottawa.

The door (fig. 16) and the catch (fig. 18) are cut out in $\frac{1}{2}$ in. board of the dimension given. It is important that the axle running through the catch be in the position as shown in fig. 17.

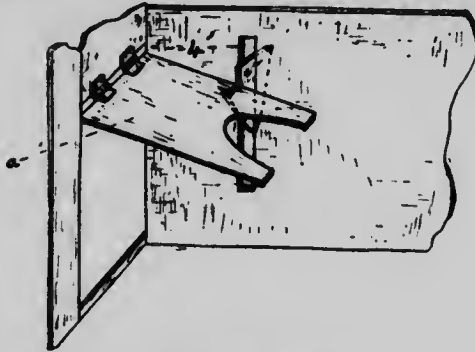


Fig. 15.—The Trap Nest set.

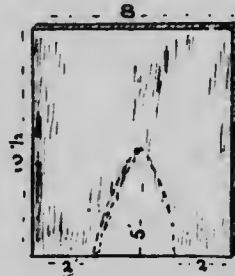


Fig. 16.—The door.



Fig. 17.—The catch in position.

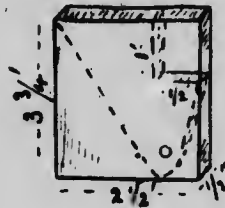


Fig. 18.—The catch.

On entering the nest, the hen raises the door (*a* fig. 15), which is resting on the catch (*b* fig. 15), when the catch immediately drops to the position shown at (*b* fig. 17), and thus prevents the door from being opened from the outside.

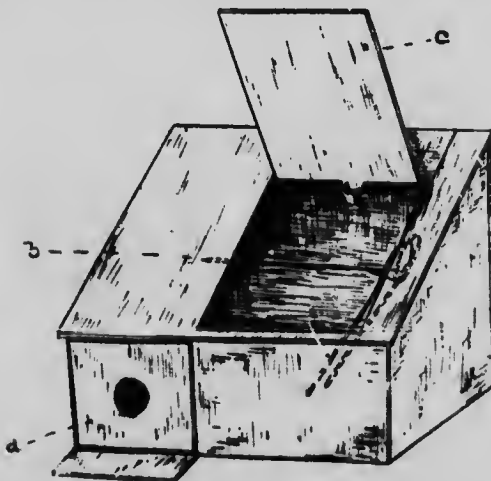


Fig. 19.

Fig. 19 *a*. The door. Fig. 19 *b*. The lever made of stout wire and suspended by staples as shown in fig. 20.

To set the nest, the door is opened and held in position by the wire (fig. 19 *b*).

On entering the nest, the hen comes in contact with the fork (*a* fig. 20) and forces it to the position (*b* fig. 20) which draws the wire from under the door when the latter falls and closes the entrance to the nest.

The hen is removed by raising the lid (*c* fig. 19).



Fig. 20.

WHERE TO KEEP EGGS SUITABLE FOR HATCHING.

Eggs for hatching must be kept in a place which is neither too warm nor too cold ; a good temperature is from forty to sixty degrees F., in which the air is neither disturbed nor vitiated ; and to avoid any vibration, they should be placed the small end downwards on a layer of grain. Thus stored, the eggs can remain for a fortnight to twenty days before being set for hatching. They must not be put either in bran, sawdust, ashes, very dry sand or any other dry matter. The pores of the shell must not be stopped up, for normal respiration is necessary to the life of the germ contained in the egg. Sawdust and ashes when dry absorb moisture and cause loss of the watery contents through the shell. Sawdust is, however, used for packing eggs to be forwarded for hatching ; in that case slightly dampened sawdust should be used, and after unpacking, the eggs should be let to stand for at least one day before being set for incubation.

Good Eggs.—The newest laid eggs are the best for hatching. They are known by their clear colour and the rough feeling of their shell, their gloss and the absence of an air space. When shaken in the hand, no movement of the contents is felt inside ; finally, they sink in water.

Bad Eggs.—Any eggs which have not a clean shell, those with an uneven (fig. 21) (fig. 22) or very transparent shell (fig. 23-24) should be rejected ; eggs either very large or very small, those known as coming from either sickly, overfat hens or poor layers are better laid aside for other purposes.



Fig. 21.



Fig. 22.



Fig. 23,



Fig. 24.

Precautions during Hatching.—Dirty eggs should be cleaned. The eggs must be kept quite clean the whole time of incubation. If the hen should dirty any during that time, wash them at once, and to do so wait till the hen is off at her meal ; use for this

a small cloth or sponge dipped in luke-warm water. Such cleaning is absolutely necessary so as to allow fresh air to penetrate through the pores of the shell to renew the supply of oxygen, an element which is indispensable to the embryo as it gradually develops in the egg during incubation.

Eggs for hatching purposes should be collected every day, the name of the breed and the date being carefully written on the small end of the egg.

NATURAL INCUBATION.

Selection of Sitters.—A good sitting hen must be of gentle disposition, well feathered and in good condition, as the period of sitting is a trying one. Do not use hens that are easily frightened or such as have the bad habit of egg eating.

Setting.—The sitting hen must be in a rather dark place, which is quiet and away from the layers and the bad sitters. If you are obliged to change her to another nest or another place, do so in the evening so that she may be disturbed as little as possible.



Fig. 25.—Nest box for Sitting Hens.

A convenient nest is easily made with a box about fifteen inches square (fig. 25). Before giving to a hen the eggs selected for hatching, it is best to place other eggs in the nest, and, if after she has had a meal, she goes back of herself to the nest, you can safely entrust them to her.

During the first days of the incubation it is better to keep the door of the box closed and to watch the hen when let out for her meals.

After three or four days the door may be left

open sometimes, however, it is better to keep it closed.

If in a dry place, this box should rather be on the ground, the soil under it being a little hollowed out and covered with some straw, chaff or dry grass.

A good diet for the sitter is Indian corn and clear water (each by itself, of course), ever ready when the hen comes out of the nest.

Against lice, some blue ointment, made by mixing strong mercurial ointment with an equal weight of lard, should be applied to the skin of the sitter, as in the case of vermin, page ; or she should be dusted, as well as the nest, with insect powder.

A few tobacco leaf stalks placed under the straw of the nest of the sitter is a good preventive of vermin ; but too many might be injurious to the embryos of the hatching eggs.

ARTIFICIAL INCUBATION.

It is certain that, when it is desired to get at the same time a hundred chickens or more, it is better to have recourse to artificial incubation, which has many advantages over natural incubation.

Advantages.—The incubator is ever ready ; it can contain a great many eggs ; no breaking is to be feared ; no bad smell ; no eggs dirtied ; no chicks crushed in hatching ; no vermin ; no sitter to be attended to, to clean every morning, and, especially, no sickness to which hens are liable during incubation, which sometimes causes serious loss. The care to be taken of sitting hens is more complicated and involves more labour than is necessary with an incubator.

The simplicity of a good machine is such that its care and management may be entrusted to any one with limited experience.

Hot Water Incubators.—In order to raise the temperature rapidly, fill up the tank with hot water; else it requires at least ten to twelve hours to reach a heat of 103 degrees F. After filling up the tank, draw a little water through the tap, so that it may not overflow when at the required temperature.

See that the machine be placed quite level.

Put the lamp in its place and keep it perfectly clean during all the time of the incubation.

The lever or regulator must remain closed; in other words, the lid at the end of the lever must stop up the opening until the inside temperature has reached 101 degrees F. Then adjust the regulator so that it raises the lid about one-tenth of an inch from the opening. After a few hours the eggs may be safely entrusted to the machine, and the next day, the regulator should be adjusted so as to bring up the temperature to 103 degrees F., and keep it at that point till the hatching takes place.

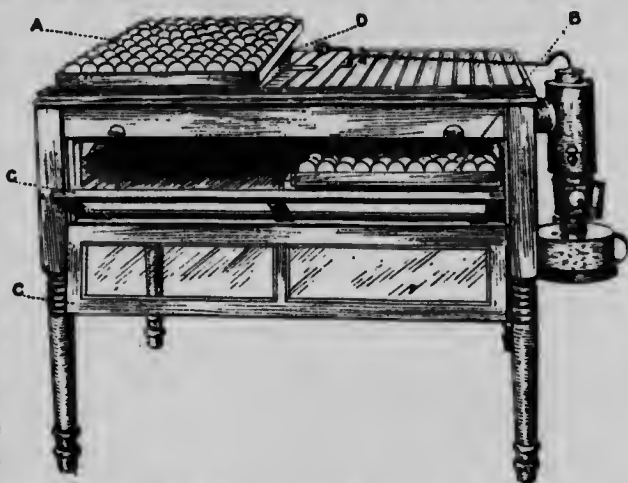


Fig. 26. Hot Water Incubator.

Hot-air Incubators.—For a hot-air machine, follow the same directions as above; but do not put any water in the tank.



Fig. 27. Hot Air Incubator.

Fig. 27 shows a brood of chickens just hatched in a hot-air incubator at the Central Experimental Farm in April, 1903.

Position of the Eggs on the Trays.—Rest the eggs on their side, the large end resting on the meshes of the netting (fig. 26 A). A too strong inclination causes an upturning of the chick in the shell, or, more correctly expressed, an abnormal displacement of the embryo, which, in consequence of the position of the egg, goes down toward the small end, and when once adhering there, remains fixed while developing. Very often, on hatching, in such cases, especially if the egg is pointed, the chick has malformed legs or a twisted neck. The eggs are shown in position during incubation at fig. 26.

Surroundings.—The room must be kept quite clean, and the incubator put on the ground floor, or in a dry clean cellar.

In poultry raising on a large scale, the floor of the incubator house should preferably be paved or of cement; it should be always covered with a layer of sand of at least two inches in thickness. The sand maintains dampness and deadens the noise of steps. Wherever the room may be, it must be quiet, without draught, with an even temperature, well ventilated and preferably dark.

Starting and Management of the Incubators.—In artificial incubation, it is essential that a close and intelligent imitation of nature be adhered to.

Without going into the directions laid down by the manufacturers of the machines, the method which has given the best results at the Experimental Farm with both hot-air and hot-water incubators will be briefly described.

A little attention to the lamp morning and evening is sufficient to keep it perfectly clean.

To prevent the lamp from smoking during each incubation, dip new wicks in vinegar for three or four hours, and let them dry thoroughly before using them. In this way, the smoking of lamps may be prevented.

Airing and Cooling.—Airing and cooling of the eggs is begun on the third day and stopped on the nineteenth; after the cooling, the eggs are turned very gently by hand. For this, the trays are laid on a table or on the machine. During all the time of the airing and cooling of the eggs, the doors of the machine are left open. (Fig. 26.) The ventilators are kept half closed during the incubation and completely open during the hatching. After the nineteenth day, the door of the incubator is kept closed tight.

The time devoted each day to the airing and the turning over of the eggs varies according to the time of the incubation. The average is:—

For the 1st week—Fifteen minutes each day.

" 2nd " Thirty minutes.

" 3rd " Forty-five minutes.



Fig. 28.

Egg Testing.—The eggs must be tested on the fifth or sixth day of the incubation. Where only one or two sittings are to be tested this can be done by holding the egg in the hand half closed and placing it in front of the light of a candle. For a larger number of eggs, the testing is done more quickly and more easily by means of the egg tester. (Fig. 28.) This little instrument allows the inside of the egg to be seen nearly

as well as if there was no shell. The testing must be done in the dark. If the egg is fertilized the germ should be seen very distinctly as in (Figs. 29, 30, 31.)

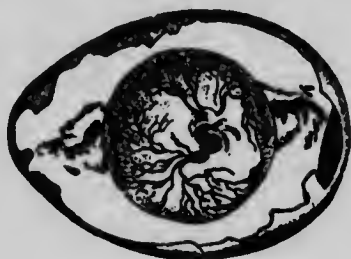


Fig. 29.



Fig. 30.

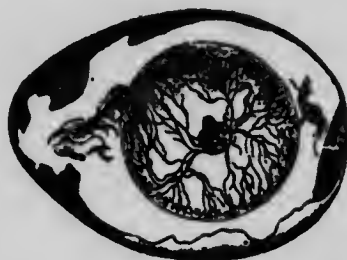


Fig. 31.

If the egg is not fertilized, and is freshly laid, it is almost quite transparent and does not seem to contain any yolk. If not freshly laid, the yolk seems to float in the midst of the white as in (Fig. 32.) If the egg is fertilized and the germ has not enough vitality to develop, the germ will be seen surrounded with a circle or a half circle of blood as in (Fig. 33.) Such eggs should be rejected. The clear eggs are still excellent for eating or if desired for feeding chicks.

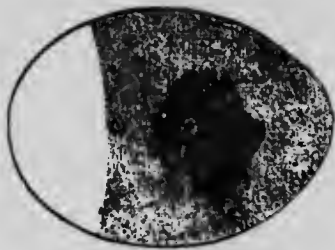


Fig. 32.

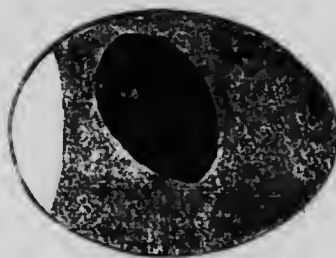


Fig. 33.

How Eggs are Tested.—Egg testing requires practice, and the beginner will some times throw away fertilized eggs.

While testing, the egg must be kept in a horizontal position, not with one of the ends downward before the egg-tester (A Fig. 28); this is sometimes a cause of mortality of the germ and certainly increases the percentage of deaths in the shell.

It is to be remembered that the germ is a delicate thing, for one single shock may break one of the elastic threads which holds the embryo in its place in the egg

The germ is held in place in each egg by two such threads. (See Fig. 34). When the egg is in an horizontal position both of these threads hold the germ in place and act evenly as elastic springs. Besides the yolk on the top of which the germ is floating, plays the part of a cushion and deadens the shock. But if the egg is turned with one end downward, one only of these elastic threads is supporting it. Under such circumstances the mere shaking of the hand of the operator may break it, and a living healthy egg is thus often returned dead into the machine after being tested. When an egg is to be tested, place towards the tester, (Fig. 28) that side which did not receive the heat when it rested on the tray in the incubator; the yolk, being lighter than the white, is thus nearer the upper wall of

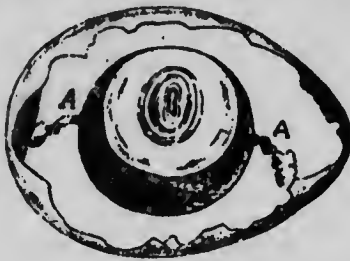


Fig. 34.

the egg and consequently is more easily seen.

After the fifteenth day, nothing is distinguished any more in the egg but an opaque mass, quite dark, with a very transparent portion at the top, towards the thick end; this is the air space which at the end occupies nearly one fifth of the whole shell, (fig. 35).

Usefulness of Testing.—The usefulness of testing is that it enables us to fill up again the number of the eggs of a sitting which has been reduced by the removal of sterile eggs or dead germs, by taking eggs from other sittings set at the same time. Where five or six hens are sitting the number of fertile eggs is sometimes reduced sufficiently to admit of their being placed under three or four hens, thus releasing one or two hens for fresh sittings.

This manipulation is possible only when the hens have begun sitting on the same day or when several incubators have been started on the same date, otherwise there will be danger for those eggs which have not then reached the stage of incubation when the germs are sufficiently strong to be submitted to that degree of aeration and cooling beneficial to the others.



Fig. 35.

Usefulness of the Turning of the Eggs.—The necessity of turning the eggs once a day or both morning and evening, may be thus explained. If the egg was left in the same position, the embryo which floats always at the upper side of the egg, would probably before long adhere to the shell and soon die.

The eggs must be allowed to cool before being turned, otherwise the embryo, being always at the top where the heat is greatest, would probably remain stuck to the bottom when the egg has been turned, if it had not had the time during cooling to come up and float in the centre of the egg.

Dampness.—In ordinary conditions, the eggs contain sufficient moisture for the requirements of incubation. The experiments made at the Experimental Farm do not show at all clearly that any moisture should be added to the machines, that is, that there is any need of putting water in the tank or tanks of the machine. The proper airing and cooling of the eggs allow the oxygen of the air, indispensable to the chick in the shell, to penetrate the egg. In short, the management of an incubator presents no difficulty. Four things only are necessary.

- 1st. Keeping as evenly as possible the temperature at 103° F.
- 2nd. Airing, cooling and turning the eggs at least once a day.
- 3rd. Good ventilation of the incubating room and protection of the machine from the sun's rays.
- 4th. Both the lamps and machine must be kept all the time perfectly clean.

Hatching.—Hatching should begin on the twenty-first day. No help must be given the chicks by breaking the shell, which might be fatal to them. Nature is to be left to do the work. The chick does not break the shell with the beak, as is generally supposed. The shell is much harder than the beak, which in the egg is only a mere horny tip, still very soft. The neck of the chick is folded, its head close against its chest; therefore the chick cannot make the least movement in order to peck (fig. 36). It 'peeps'; feeble faint sounds are heard, that is all. It is true that the point of the shell which breaks first is mostly in front of the beak; but that is merely a provision of nature to allow the chick to fill up its lungs as soon as it is born to life. Thus strengthened,



Fig. 36.

it exerts itself in every direction to break its prison. At the right moment the shell, weakened by the evaporation of its fluid constituents, as a result of its having been kept during the incubation period at a heat of 102 to 104 degrees, gives way and splits in a circle (fig. 37).

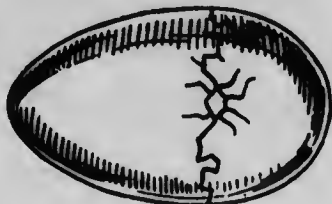


Fig. 37.

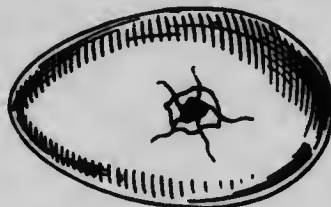


Fig. 38.

Eggs at hatching time roll upside down; a strong and vigorous chick moves with such force that it will free itself; but a weak one, instead of making the shell break all round, breaks only a little hole, through which the beak is to be seen (fig. 38), and often a bloody or watery liquid oozes out and sticks to the tray.

The incubator must not be opened during the hatching. A hen never gets off her eggs while the chicks are hatching.

After the chicks are hatched they must be given neither food nor drink for thirty-six hours, so that they may have time to digest part of the yolk with which their intestines are still filled; if they are fed before this time many die of indigestion. It is advisable to remove the chicks in the evening from the incubator into the brooder. The next morning they are ready to receive their first food.

The following tables are not given to show the results which can be expected from natural or artificial incubation, but simply to establish a comparison between the methods followed at the Central Experimental Farm; for in ordinary circumstances better results are to be expected, as the farmer has mostly only one breed or variety of poultry with an unlimited run. A large range is one of the chief factors in the vitality of the germ. The following figures quoted are the results of experiments conducted during the spring of 1904 with birds kept in warm houses, having had indeed plenty of exercise but kept penned up or in a limited run during all the time the eggs were collected for hatching.

A few particulars are now given as to the manner of handling the different incubators and the treatment of the eggs during incubation.

These details are those of experiments conducted after our own methods, independently of the directions given by the makers of the different machines.

The statements Nos. 1 and 2 were obtained with two similar machines.

NO. 1 TEST.—PRAIRIE STATE INCUBATOR. HOT AIR.

Filled on February 20, 1904, with eggs in quality and kind as follows :—

Description of Eggs.	No. of Eggs.	Clear Eggs 1st Test.	Dead Germs 16th day.	Chicks dead in Shell.	Chickens Hatched.
Silver Laced Wyandottes.....	20	3	7	2	8
Buff Orpingtons.....	14	3	8	3	0
Silver Grey Dorkings.....	14	2	8	0	4
Faverolles.....	12	2	3	4	3
White Wyandottes.....	9	2	7	0	0
Barred P. Rocks (No. 2 pen).....	8	0	3	3	2
Black Hamburgs.....	7	3	4	0	0
White Plymouth Rocks.....	6	0	0	0	6
Total.....	90	15	40	12	23

Birds had all the same care and feeding.

Incubator was operated in the office, the atmosphere of which was very dry.

Variation of temperature in room during hatch was from 25 to 30 degrees.

No moisture was used in either machine or room.

Time of cooling the eggs was :—

1st week 10 to 12 minutes.

2nd week 15 to 20 minutes.

3rd week 25 to 30 minutes.

Door of incubator was left open during the cooling of the eggs.

Eggs were turned once per day after cooling.

TEST NO. 2.—CHATHAM 'RED BIRD' INCUBATOR.—HOT AIR.

Filled on February 27, 1904, with eggs as follows :—

Description of Eggs.	No. of Eggs.	Clear Eggs 1st Test.	Dead Germs 16th day.	Chicks dead in Shell.	Chickens Hatched.
Buff Orpingtons.....	16	4	5	2	5
Silver Grey Dorkings.....	16	1	8	3	4
Silver Laced Wyandottes.....	15	2	2	1	10
White Wyandottes.....	11	3	6	1	1
Faverolles.....	11	3	3	3	2
Barred P. Rocks.....	13	0	3	4	6
Black Hamburgs.....	8	2	6	0	0
Black Minorcas	5	1	4	0	0
White P. Rocks.....	5	2	2	1	0
Total	100	18	39	15	28

Birds were kept under same conditions with exception of Barred and White P. Rocks which were under experiment.

Incubators were placed in same office as No. 1.

Temperature of room and time of cooling the eggs same as No. 1.

Water was constantly kept in moisture pan.

TEST No. 3.—CYPHER'S INCUBATOR (220-EGG SIZE). HOT AIR.

Filled on March 5, 1904, with following eggs:—

Description of Eggs.	No. of Eggs.	Broken by Accident.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.
Buff Orpingtons.....	43	4	8	13	5	13
White Wyandottes.....	32	2	12	9	2	7
Silver Grey Dorkings.....	27	0	5	18	1	3
White Leghorns.....	23	0	2	13	7	1
Barred P. Rocks.....	20	0	1	10	5	4
Black Minorcas.....	16	0	2	7	3	4
Rhode Island Reds.....	12	0	2	6	4	0
Faverolles.....	10	0	2	5	1	2
Silver Laced Wyandottes...	16	0	1	3	2	10
Black Hamburgs.....	10	0	1	5	2	2
Jubilee Orpingtons.....	8	0	2	6	0	0
Buff Leghorns.....	7	2	1	1	0	3
White Plymouth Rocks.....	4	0	1	2	0	1
S. Spangled Hamburgs.....	2	0	0	2	0	0
Total.. ..	230	8	40	100	32	50

This incubator was placed in same office as Nos. 1 and 2, with similar variations of temperature.

Time of cooling eggs same as Nos. 1 and 2.

TEST No. 4—DES MOINES (HOT WATER) INCUBATOR. 260-EGG SIZE. FILLED APRIL 26, 1904.

This test and the following one was conducted in a new building erected after the fire previously referred to. The incubator was filled with the following eggs:—

Description of Eggs.	No. of Eggs.	Accidentally Broken.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	No. of days.	Temp. of Room.		Temp. of Incubator.		Time of Cooling.	Remarks.
								A.M.	P.M.	A.M.	P.M.		
Barred P. Rocks.	38	1	5	8	1	23	1	52	58	92	102	10 minutes.	1st cooling and turning a.m. 1st test.
White Leghorns.	45	2	5	5	0	30	2	58	58	102	102	12 "	
B. P. R.—Bro. Leghorn Cross.	22	0	8	1	0	13	3	57	67	102	102	12 "	
Silver Grey Dorkings.	21	0	8	1	0	12	4	58	64	102	102	12 "	
White Wyandottes.	18	0	3	2	1	12	5	54	64	102	103	12 "	
Buff Orpingtons.	14	0	5	4	1	4	6	60	80	103	103	14 "	
White Plymouth Rocks.	15	1	0	4	0	10	7	65	82	103	103	14 "	
White Wyandotte Cross.	14	0	0	3	0	11	8	52	86	103	103½	15 "	
Jubilee Orpingtons.	9	0	0	2	0	7	9	56	80	102	103	15 "	
Light Brahmas.	10	1	2	1	1	5	10	56	74	102	104	15 "	
Black Hamburgs.	10	1	2	1	0	6	11	61	84	103	104	15 "	
Silver Laced Wyandottes.	5	0	0	0	0	5	12	67	81	103	103	15 "	Last test. Last cooling.
Faverolles.	6	0	2	0	1	3	13	66	87	102½	104	20 "	
Black Minorcas.	3	0	0	0	0	3	14	59	78	102	103	30 "	
S. Spangled Hamburgs.	7	0	1	2	0	4	15	63	70	103	103	30 "	
							16	65	75	103	103	30 "	
							17	59	83	102½	103	30 "	
							18	58	84	103	104	30 "	
							19	67	61	103	103	35 "	
							20	60	64	103	103		
							21	56	78	103	103		
	237	6	41	34	8	148							

Eggs were turned twice per day, the first at cooling time and once afterwards.
Ventilators half open all the time.
Doors of the incubator were left open all the time of cooling.
No moisture was used in machine.

TEST No. 5.—CYPHER'S INCUBATOR (220-Egg Size). HOT AIR.

Filled on May 14, 1904, with following Eggs. Machine was operated in new building for reason explained in No. 4.

Description of Eggs.	No. of Eggs.	Clear Eggs.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Days.	Temp. of Room.		Temp. of Incubator.		Time of Cooling Eggs.	Remarks.
							A.M.	P.M.	A.M.	P.M.		
Barred P. Rocks.	31	14	0	2	15	1	67	84	103	103		
Buff Oringtons.	26	5	3	1	17	2	67	61	103	103		
White Plymouth Rocks.	21	0	5	4	12	3	60	64	103	103		
Black Hamburgs.	15	2	5	4	4	4	56	78	103	104	15 minutes.	1st cooling of eggs.
B. P. R.—Brown Leghorn Cross.	16	5	0	0	10	5	57	78	103	103	25 "	1st test.
White Wyandottes.	15	8	1	2	4	6	60	65	103	103	25 "	
Silver-Laced Wyandottes.	12	3	3	1	5	7	62	72	104	103	25 "	
Faverolles.	11	4	2	2	3	8	63	84	103	103	30 "	
White Leghorns.	14	1	3	1	9	9	68	67	103	103	30 "	
Light Brahmas.	11	5	4	1	1	10	66	76	103	103	30 "	
Black Minorcas.	7	1	1	1	4	11	69	88	104	104	30 "	
S. Spangled Hamburgs.	7	2	4	0	1	12	70	72	104	103	28 "	
Buff P. Rocks.	5	0	1	1	3	13	68	83	104	103	45 "	
Silver Gray Dorkings.	9	2	0	1	6	14	66	84	103	103	45 "	
						15	56	76	104	103	45 "	Last time of testing.
						16	58	76	103	103	40 "	
						17	60	76	103	103	45 "	
						18	64	71	103	103	45 "	
						19	60	39	102	103	45 "	Last time of cooling.
						20	60	71	103	103	45 "	
						21	71	76	103	103	45 "	
Total.....	200	52	33	21	94							

Eggs were turned twice per day.
Ventilators half open all the time.
During the time of cooling eggs the incubator doors were left open.

TEST No. 6.—FOUR HENS AS HATCHING MEDIUMS.

On April 20, 1904, they were given 13 eggs each of the following kinds:—

Description of Eggs.	No. of Eggs.	Clear.	Dead Chicks in Shell.	Chickens Hatched.
S. G. Dorkings	8	3	0	5
White Leghorns	8	0	3	5
B. P. R.—Brown Leghorn Cross	4	1	0	3
Black Hamburgs	3	0	0	3
Buff Orpingtons	3	0	0	3
White Wyandottes	5	1	0	4
Barred P. Rocks	5	1	0	4
Faverolles	3	0	0	3
Jubilee Orpingtons	3	1	1	1
White Plymouth Rocks	2	0	0	2
S. Spangled Hamburgs	2	0	0	2
Buff Plymouth Rocks	2	0	0	2
Light Brahmas	1	1	0	0
Black Minorcas	3	1	0	2
Total.	52	9	4	39

TEST No. 7.—In which a number of hens were used as hatching mediums. They were set at different times during May, 1904, on the following eggs:—

Date when set.	Description of Eggs.	No. of Eggs set.	Clear.	Dead Germs.	Dead Chicks in Shell.	Chickens Hatched.
1904.						
May 2..	Light Brahmas	10	2	0	2	6
" 5...	Buff Leghorns	36	10	1	1	24
" 5...	Black Minorcas	52	10	8	10	24
" 7..	White Wyandottes	60	17	5	6	32
" 14...	S. G. Dorkings	15	3	2	3	7
" 14...	Faverolles	15	3	1	1	10
	Total	188	45	17	23	103

The number of clear eggs on May 2, 5 and 7, goes to show that the birds, in the latter part of the month of April when the eggs were collected, had not completely recovered from the effects of the fire which occurred on the 8th of the latter month. Later, the percentage of clear eggs, it will be noticed, is very much less.

CAUSES OF THE NON-FERTILIZATION OF THE EGGS.—It is often a matter of surprise to find, when testing the eggs, that from fifty to sixty or more out of a hundred are clear.

There are many causes of the non-fertilization of the eggs:—

- (1.) Overfat state of the breeders—one of the chief causes.
- (2.) Lack of exercise.
- (3.) Sudden changes in temperature.
- (4.) Too many or too few hens for one cock. In a small run, ten to fifteen hens suffice; when running at large, from twenty to thirty-five are not too many, depending on the vigour of the breed.

(5.) The age of the cock ; when over four years old, he is no more able to fertilize as large a number of hens.

(6.) Unhealthy and insufficient food.

(7.) The dirty and unhealthy state of poultry-house and yard.

These are the commonest reasons for lack of vitality in the eggs.

In a run which is too damp or too small, hens deprived of green plants and insects will lay eggs many of them clear, even if mated with a strong male bird, because without being apparently sick they are not by any means in robust health.

MORTALITY IN THE SHELL.—Many breeders, especially beginners, lay down this as a principle. The egg is fertilized, therefore it will hatch. This is a great mistake. As a rule, for those who are hatching their eggs artificially they often think that the incubator is at fault. No doubt, in many cases, the fault is with the incubator ; but sometimes the fault is with the breeder.

There are indeed several causes of the mortality in the shell. One as already explained is in the way of testing the eggs ; but the chief one and the most serious, is the weakness of the germ, a result of the poor care taken of the breeders. This is an essential point.

The percentage of weak germs in the shell is especially high in the eggs of birds that have a limited run. If well fertilized eggs are wanted, the food of the layers must be of good quality. During the breeding season, it is better to reduce considerably the soft rations and to feed good grain, preferably a mixture of wheat, buckwheat and oats.

Mouldy or fermented grain may be a direct cause of disease of the intestines of fowls, which may then be communicated to the egg.

Scrabby, weak or sickly stock is what gives the largest percentage of mortality in the shell.

CAN THE SEX OF THE CHICK BE FORETOLD?—We are some times asked : ' Please send me eggs of such and such a shape, for I want to raise only cockerels, or only pullets.'

It is impossible to foretell the sex of a chick not yet hatched, though certain circumstances may affect the production of a large number of birds of either sex.

Eggs collected in the early part of the season have usually given more males than females ; also, when a cock had only a very limited number of hens to fertilize. The reason is that the cock in spring is in his full vigor, but becomes less vigorous as the season advances.

If the male parent is old and the females young more hens than cocks will be had ; the contrary is true if the cock is young and the hens old.

As to the shape of the egg it varies according to the age of the layers ; thus, the eggs of pullets are smaller and more pointed than those of old hens.

Long and pointed eggs do not give any more males than round ones.

Some say that an egg produces a cock if its crown or air space is horizontal ; a hen if it is oblique, that is, slanting. In our experience we have not found such results.

HOW LONG DOES THE EFFECT OF FERTILIZATION LAST.

Two interesting experiments, particulars of which are given in the two following tests, were made at the conclusion of the breeding season last summer. The objects aimed at were :—

1. To find out how long after the removal of the male bird from the breeding stock was fertilization strong enough to hatch out a healthy chicken.

2. How long after the removal of the male bird could the effect of fertilization be traced ?

The questions are answered by the results in the following tests 8 and 9.

TEST No. 8.—With seven Barred P. Rock hens from which the male (bird was separated on June 29, 1904. On the same day eggs were put into an incubator and thereafter, from time to time during twenty days. Details are :—

Date.	No. of days male bird separated from hens.	No. of eggs set.	Clear eggs. — 1st test.	Dead germs.	Dead in shell.	Chickens hatched out.	Remarks.
1904.							
June 29.	.....	3	1	1	.....	1	Strong chicken.
" 30.	1	1	1	.....	.....	.....	No results from this egg as it was clear.
July 1.	2	3	1	.....	.....	2	Strong chicken.
" 2.	3	3	1	.....	.....	2	"
" 3.	4	2	1	.....	.....	1	Weak chicken.
" 4.	5	2	1	.....	.....	1	Healthy chicken.
" 5.	6	3	1	.....	.....	2	"
" 6.	7	1	1	.....	.....	.....	Egg without germ ; no result.
" 7.	8	1	.....	1	.....	.....	Germ dead from weakness.
" 8.	9	1	1	.....	.....	.....	Egg not fertilized ; no result.
" 9.	10	1	.....	.....	1	.....	Chicken partly developed ; dead from weakness.
" 10.	11	.....	.....	.....	.....	.....	No eggs laid this day.
" 11.	12	1	.....	.....	1	.....	Chicken dead in shell evidently from weakness.
" 12.	13	1	1	.....	.....	.....	Egg without germ ; no result.
" 13.	14	.....	.....	.....	.....	.....	No egg laid this day.
" 14.	15	2	2	.....	.....	.....	Eggs without germs ; no results.
" 15.	16	1	1	.....	.....	.....	" "
" 16.	17	2	2	.....	.....	.....	" "
" 17.	18	.....	.....	.....	.....	.....	No eggs laid this day.
" 18.	19	1	1	.....	.....	.....	Eggs without germs ; no results.
" 19.	20	1	1	.....	.....	.....	" "
" 20.	21	1	1	.....	.....	.....	" "
		31	18	2	2	9	

TEST No. 9.—With five White Leghorn hens. Cock bird separated from hens on June 23, 1904. Eggs put into incubator five days later and thereafter for twenty days. Details are as follows:—

Date.	No. of days male bird separated from hens.	No. of eggs set.	Clear eggs. — 1st test.	Dead germs.	Dead in shell.	Chickens hatched out.	Remarks.
1904.							
June 28..	5	4	2	.....	...	2	Strong chickens. Eggs laid 5 days after removal of male bird from hens.
" 29..	6	3	1	1	.....	1	Strong chicken.
" 30..	7	4	1	.....	.....	3	Strong, healthy chickens. Male bird away from hens seven days.
July 1..	8	2	.....	.....	1	1	Strong, healthy chick. Male bird away from hens eight days.
" 2..	9	3	.....	.....	.....	3	Chickens weak; had to be helped out of shells.
" 3..	10	2	.....	.....	.....	2	Fairly strong and healthy. Male bird away from hens ten days.
" 4..	11	3	2	.....	.....	1	Weak and infirm. Male bird away from hens eleven days.
" 5..	12	1	1	.....	.....	.....	Egg without germ. No eggs with germs after this date.
" 6..	13	2	2	.....	.....	.....	Eggs without germ.
" 7..	14	2	2	.....	.....	.....	"
" 8..	15	1	1	.....	.....	.....	"
" 9..	16	2	2	.....	.....	.....	"
" 10..	17	.....	.....	.....	.....	.....	No eggs laid this day.
" 11..	18	.....	.....	.....	.....	.....	"
" 12..	19	1	1	.....	.....	.....	No germ in egg.
" 13..	20	1	1	.....	.....	.....	"
" 14..	21	1	1	.....	.....	.....	"
" 15..	22	1	1	.....	.....	.....	"
" 16..	23	3	3	.....	.....	.....	"
" 17..	24	1	1	.....	.....	.....	"
" 18..	25	3	3	.....	.....	.....	"
		40	25	1	1	13	

It is interesting to note the result of the two tests. In the first test, No. 8, fertilization was strong enough in 6 eggs laid on the 5th day, after removal of the male bird from the breeding pen, to hatch out two healthy chickens. The last trace of fertilization is found in an egg laid eleven days after removal of the male bird. Examination of this egg, in course of incubation, showed a fairly well developed chicken dead in the shell. It had evidently died in progress of development from weak germination. No further evidence of fertilization was found in this test.

In the second case, test No. 9, strong chickens are hatched from eggs laid on the eighth day after removal of the male bird and fairly strong and healthy chick from eggs laid on the tenth day after separation. From the three eggs laid on the eleventh day after separation a weak and infirm chicken was hatched. After this there was no trace of fertilization.

Another interesting result which made itself evident was the comparative unimpaired condition of the unfertilized eggs at the conclusion of the 21 days' tests. These unfertilized eggs were taken from the incubator on the 22nd day, after they were put into the machine. During that time they were subject to the ordinary temperature of 103 degrees of heat usually maintained for the hatching of chickens from fertilized eggs. On examination, these unfertilized eggs were found to be in as equally good condition and flavour—if not better in some instances—than the majority of midsummer eggs. This strongly emphasizes the advice so frequently given in previous reports and repeated in a previous page of this one—'that farmers should make it a rule to keep no male bird with the hens which lay the eggs to be taken to market, or sold to

store or middleman.' This experience in relation to the superior keeping qualities of unfertilized eggs is by no means a new one in our department. On the occasion of the two tests described above there was good opportunity for extended and correct examination, and the results which were so evident in so many cases, not only go to prove the correctness of previous advice, but should be a useful warning to all who are desirous of obtaining the highest price 'for the strictly new laid egg with flavour intact,' more particularly in summer time when conditions for germ development are so favourable.

Time required for Fertilization.—A question which has, no doubt, some importance in hatching eggs is to know the time required after mating for fertilization. Experiments made during the spring of 1905, in this connection, showed that in each case eggs laid forty hours after mating were perfectly fertilized. The chickens hatched from such eggs were always as strong as those from eggs laid a longer time after the first mating.

How many Hens should be allowed to one Cock?—Another important question is the number of hens to be allowed to one cock in order to obtain eggs satisfactorily fertilized. No figure can be set for all cases; but a sure fact is that the closer the confinement of the breeding stock, the less satisfactory will be the result. On the contrary, a large and free run in the open air promotes the generative power more probably in the male than in the female. The same is true of birds kept in warm winter quarters, with little exercise and without fresh air. On the contrary, those kept in a cold, well ventilated building, and constantly active, scratching for their food, will produce a larger proportion of well fertilized eggs.

As a rule, a cock which has attained the standard weight of his breed and has an unlimited run, may be safely given from twenty to thirty-five hens; while in a small run, half of this number would be sufficient. In confirmation of these facts, there are instances which have recently been brought to my attention by outside breeders. In the first case, one cock which was kept with twelve hens all winter in a heated house, with but little space and exercise, and confined during the whole time of breeding. Out of forty-eight eggs set in the incubator on March 21, 1905, twenty-eight were clear and only twenty fertilized; of the latter ten hatched, the others died during the incubation or at the pipping stage.

In another case, one cock with forty-five hens, kept in a very cold house (so cold that several of the hens were frozen), taking much exercise and in the fresh air, in the scratching pen and running at large during the breeding season. Out of one hundred and fifty-six eggs set in the incubator at the same date, one hundred and fifteen were fertilized, and ninety-four chickens hatched. The food was alike in both cases.

In another incubation, one month later, on April 20, 1905, from the same fowls, out of two hundred and four eggs, sixty were clear, one hundred and six hatched, seven died before the period of hatching, and thirty-one died in the shell.

These results serve to show that a cock at liberty has not too many with about thirty hens.

Suspension of Life in Chicks during Incubation.—M. Bouchut, of the Paris Academy of Sciences, used some eggs in incubation to show that the entire cessation of the beating of the heart does not take place even when there seems to be a cessation of life. In such cases there is merely a decrease in the number and the energy of the pulsations.

"If hen eggs," M. Bouchut says, "are removed from an incubator or from under a sitter after three days of incubation, the pulsations of the heart are seen to become slower in the egg and finally become so rare that it might be believed that they have altogether stopped, and as if life had left the embryo. The heart ceases beating usually after the twenty fourth hour from the cooling. If then the egg is placed in luke warm water the heart begins again to beat."

I have myself observed the same phenomenon; but, instead of plunging the egg in lukewarm water, I placed it again under the sitter or in the machine.

In experiments conducted some years ago, during the month of May, I found that a setting of thirteen eggs, placed under a hen, were after six days of incubation left to

themselves for thirty hours and cooled; they were then placed again under another sitter, when ten strong chicks hatched on the twenty-second day of incubation.

On a second occasion, on the eighth day of incubation the lamp of the incubator was left out for thirty-six hours, when the temperature was raised again to the usual point (103 degrees F.). The hatching took place in a satisfactory manner, and the result was just as good as in ordinary cases; the only difference was the loss of one day in incubation.

These facts show that, if similar accidents happen during incubation, there is no cause for excessive alarm, nor should the eggs be rejected as of no value for further incubation.

POULTRY RAISING.

Land for Raising Chickens.—The ground may vary in size, according to the number of birds to be raised, but it must be spacious and well fenced in.

It is desirable that the soil be of a sandy nature, but any sort of soil will serve the purpose provided it is not marshy.

An orchard makes the most suitable ground, because the four chief requirements are always met there: space, shade, grass and insects. Whatever be the ground, if there are no shrubs, some should be planted, so that the chickens may find shade when they feel the need of it.



Fig. 39. Brooding coop, C. E. F., Ottawa. Fig. 40. A Brooding coop with a small run for the mother, Central Experimental Farm, Ottawa

Care of the Brooding Hen.—When the chicks are hatched, they are conveyed with the mother hen to a coop set on the grass. The hen is first placed in her compartment (Fig. 39), then the chicks are gently put under her. The mash must be placed quite close to the hen, so that she need not get up to eat it.

Unless it is very hot weather, the chicks will remain nearly the whole time under the mother.

Food, warmth, and cleanliness are the essential conditions in the raising of chickens.

For the first two weeks, the mother must be kept shut in under coop and run (Fig. 40.) In this way the chicks can come out and eat, and run about on the grass or go back when they wish to warm themselves under their mother.

Brooder or Artificial Mother.—The brooder is an apparatus destined to replace the mother hen in the rearing of the chicks. The modern brooders are nearly all well adapted for the purpose; therefore, in raising chickens on a large scale, success is much more certain by the use of such brooder than by using hens.

A brooder is a large square box divided into two compartments, at one end is an artificial mother. The floor is covered with a thin layer of sand or fine straw. The chicks receive the heat from the upper part of the apparatus which is made of galvanized iron.

The size and shape of the brooder and of the heating apparatus may be varied as desired.

During the first days the inside temperature of the brooder must be maintained between 85 and 90 degrees F., and gradually reduced as the chickens grow and thrive. The brooder must be cleaned every morning.

When the weather is warm and the chicks begin to get their feathers, that is, when about four or five weeks old, it is no more necessary to heat the brooder with the lamp, the animal heat is sufficient.

Care of the Chicks.—During the first twenty-four or thirty hours they should not receive any food and no water to drink for the first three days, these are two essential conditions for their health. The giving them rest is no less important, the chick, either in the brooder or under its mother, should be resting at least twenty to twenty-five minutes of every hour during the first six or seven days. To make the chicks rest in the brooder, they must be compelled to go into it, where they are kept in comparative

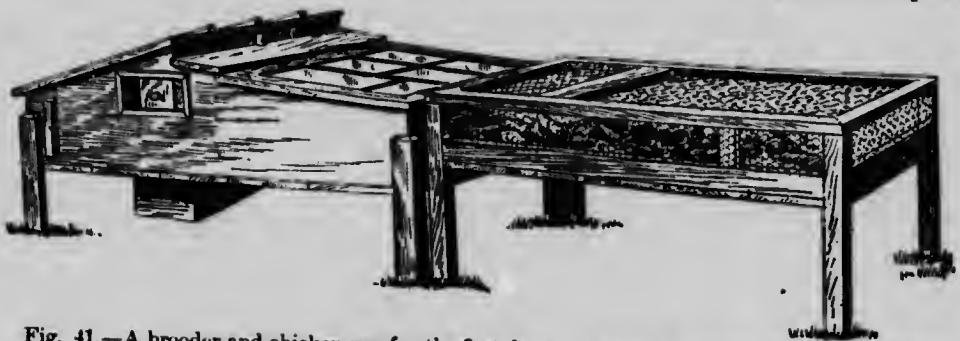


Fig. 41.—A brooder and chicken run for the first days. Central Experimental Farm, Ottawa.

darkness by raising the door between the brooder and the scratching or feeding compartment. After six or seven days one hour of rest in the forenoon and one in the afternoon are sufficient.

During the first days the chicks should be taken out for a short time in a little enclosed run (fig. 42.) A few minutes only at first and then again in the same way an hour later. With a brooder resting on the ground itself, the run can be made without any floor.

After the chicks have thus been taken out a few times, they will all soon know very well the door of their brooder; then a netting or boards may be arranged around the brooder (fig. 41) so that they may benefit by running about on the grass; then the most difficult part in the raising will be over.

When the feathers of the tails and wings begin to grow, the chicks require more care; they must not be left in a damp place nor be allowed to run about with the mother among grass covered with dew or rain; they must be taken in sooner than usual

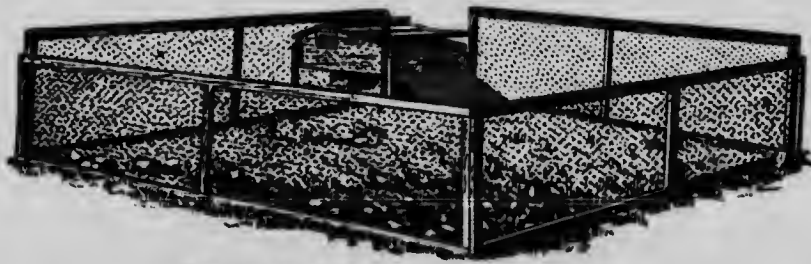


Fig. 42.—A brooder with run for the first weeks.

in the evening and be well fed. When the feathers of the tail and wings are beginning to show, the chicks are nearly safe; they can then be left free in the poultry yard with their mother or their brooder, care being taken not to leave them in the rain, for rain and dew are always injurious to them.

It is best to separate the cockerels from the pullets when they are two months to two and a half old.

Cockerels destined to be fattened may be kept in close quarters. Pullets that are intended for layers, should be kept in small colonies of forty to fifty in each run with a little colony house for protection. (Fig. 53, 54 and 55).

Food.—Especially in artificial raising, a common bad habit is to give too much food to the chicks, and pleasure is found in seeing them with their crop well filled up. This is a mistake, a chick during the first few days needs much more heat than food.

During this time, therefore, the chicks must receive as food nothing but mash composed of hard-boiled eggs, bread crumbs, &c., preferably soaked in milk, and well drained by pressing in the hand. A little later, add to the mash oat meal, bran, midlings, corn meal or cooked potatoes. When the chicks are about three weeks old a few crushed wheat or corn kernels are given, the quantity being increased as they grow. In order to excite the appetite of all, the food must be varied. When seven to eight weeks old, they may be fed twice a day, in the morning and the evening, a mixture of good grain such as wheat, crushed corn, oats, buckwheat, &c. They should be fed in moderate quantity not more than they can eat up clean. Whenever mash or grain is left in the little troughs or on the feeding place half an hour after the meal, it is evident that too much has been given; the ration must then be reduced.

Chickens, like human beings, enjoy food varied from day to day.

The food must be given often and little at a time. Water must always be fresh and clean. Food should be given in small flat wooden troughs. The most suitable are provided with a lid and pierced with side openings, so that it is impossible for the chickens to go in and soil the food, which at the same time is sheltered from the rain.

Chicks reared in an enclosed run must be fed a certain amount of animal and vegetable food, lime and fine grit.

FLESHING CHICKENS AND FATTENING OLD HENS.

SOME OF WHICH WERE LOOSE IN PENS WITH LIMITED RUN AND OTHERS IN CRATES.

The experimental fleshing of chickens and fattening of old hens, during the past season, were conducted by our poultry department. Details are given in following pages. The terms 'fleshing' and 'fattening' are used with intent, for experience has shown, that rations which are calculated to—and really do—go into 'flesh,' in the case of chickens, are frequently found in the shape of 'fat' in old hens. Experience has also shown that while flesh is desirable, fat—particularly that of old hens—is simply waste. The accumulation of fat in old hens doubtless makes increased weight and may mean a little more money to the seller, but, it is certainly loss to the purchaser, for, it is of no value to him whatever.

On the present occasion, hens of two years of age and chickens of two and three months old, were used.

The experimental fleshing of chickens in our department for several years has shown that before the best specimens can be produced the following preliminary conditions must be thoroughly understood, viz.:—

1. Chickens intended for fleshing should be of correct market types, such as can only come from the utility breeds. Hence the necessity of the parent stock being of proper breed and type
2. Chickens should be well cared for and properly fed from time of hatching until put into pen or crate for 'finishing.'
3. The better the condition of the chickens when put into pen or crate to flesh the quicker and more complete will the 'finishing' process be.
4. Chickens which have been permitted 'to pick up their own living,' take more food, a longer period to flesh, and in the end seldom make specimens that will bring the highest price.

Attention to the foregoing points will certainly bring about the best results.

In the following experiment of Pen vs. Crate, the chickens were in five groups and the hens in one.

Each chicken and hen had a distinguishing number on a metal band round one of its legs.

Except where described the cross-bred chickens were of the ordinary barn-yard type.

The birds were fed twice per day and the rations were made of the consistency of thin porridge..

DETAILS OF EXPERIMENT in Fleshing Chickens in Pens and Crates. August 19, 1904.

Pen or Crate.	No. of leg band on Chicken.	Breed.	Cockerel or pullet.	Age.		Weight.																
				Months.	Days.	Beginning of Experiment.	1st Week.		2nd Week.		3rd Week.		4th Week.		Average at beginning of Experiment.		Average at close of Experiment.		Average total gain by chicken in 4 weeks.		Average gain by chicken in 1 week.	
							Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.
Group No. 1.																						
Pen.	16	B. Ply. Rock	C	3	14	3 15	4 11½	5 6	5 14½	6 1	6 1	6 1	6 1	} 4 11½	5 14½	1 12½	0 7½					
"	25	"	C	3	14	4 5	4 14½	5 10	6 1	6 6	6 6	6 6										
"	37	"	C	3	4	3 7	3 12½	4 1	4 5	4 9½	4 9½	4 9½										
"	52	"	C	3	19	4 14	5 7	6 0	6 8	6 11	6 11	6 11										
"	62	"	C	3	4	3 9½	3 15½	4 10	5 1½	5 8	5 8	5 8										
"	72	"	C	3	19	4 9	4 15	5 9	5 14	6 3	6 3	6 3										
Group No. 2.																						
Crate.....	20	B. Ply. Rock	C	3	14	4 11	5 1	5 8	5 15	6 1	6 1	6 1	} 3 13½	5 8	1 10½	0 6½						
"	21	"	C	3	4	3 5	4 0	4 3½	4 7	4 12	4 12											
"	31	"	C	3	4	3 1	3 10	4 5	4 15	5 2	5 2											
"	63	"	C	3	14	3 8	4 0½	5 0	5 9½	5 15	5 15											
"	86	"	C	3	14	4 1	4 5½	4 11½	4 15½	5 3½	5 3½											
"	95	"	C	3	14	4 5	4 14½	5 2½	5 10	5 14½	5 14½											
Group No. 3.																						
Pen.....	91	Crosses.....	C	3	14	3 4	3 12½	3 12½	4 11	5 0	5 0	5 0	} 3 ½	4 9½	1 8½	0 6½						
"	23	"	C	3	14	3 7	3 15½	3 15½	4 11	5 0	5 0											
"	29	"	P	3	0	2 5	2 12	2 15	3 3	3 3½	3 3½											
"	35	"	P	3	4	2 12	3 5	3 5	4 0	4 6	4 6											
"	64	"	P	3	14	3 0	3 8	4 1	4 5	4 9	4 9											
"	66	"	C	3	14	3 7	4 0	4 10½	5 0	5 4	5 4											
Group No. 4.																						
Crate.....	18	Crosses.....	C	3	14	3 2	3 5½	3 10	3 14½	4 1½	4 1½	4 1½	} 3 1½	4 5½	1 3½	0 4½						
"	21	"	C	3	4	2 14½	3 6	3 14½	4 4	4 7½	4 7½											
"	40	"	P	3	4	2 13	3 3	3 11½	3 14	3 14	3 14											
"	68	"	P	3	14	3 7	3 14½	4 6	4 11	4 12½	4 12½											
"	87	"	P	3	14	3 1	3 3½	3 8	3 10	3 10	3 10											
"	91	"	C	3	14	3 5	3 13	4 5½	4 4	4 4	4 4											

CHICKENS vs. HENS IN PEN.

Pen or Crate.	No. of leg band on Chicken or Hen.	Breed.	Cockerel, Pullet or Hen.	Age.		Weight.												Average at begin- ning of Experi- ment.	Average at close of Ex- periment.	Average total gain by chick- en in 4 weeks.	Average gain by chicken in 1 week.
				Months.	Days.	Beginning of Experiment.	1st Week.		2nd Week.		3rd Week.		4th Week.								
							Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.							
Group No. 5.																					
Pen	19	B. P. Rock.	C	2	29	2	10	3	1	3	12	4	0	4	3						
"	20	"	C	2	29	2	12	3	2	3	6	4	5	4	11						
"	29	"	C	3	4	3	9	3	14	4	7	4	13	4	15						
"	32	"	C	2	29	2	13	3	7	4	12	4	8	4	12						
"	39	"	C	2	29	2	13	3	7	4	12	4	8	4	12						
"	50	Cross Wh. Wy. & B.L.	C	2	4	2	1	2	8	2	14	3	5	3	9	2	10				
"	72	"	C	2	4	1	14	2	5	2	15	3	5	3	8						
"	28	S. L. Wy...	C	2	16	2	8	2	14	3	7	3	13	4	2						
"	42	Buff Orp.	C	2	16	2	4	2	11	3	6	3	14	4	3						
"	87	W.W.&B.L.	C	2	16	2	6	2	12	3	5	3	11	3	14						
Group No. 6.																					
		Hens.			years.																
Pen	23	Buff Orp....	H	2	2	5	6	7	2	7	10	7	13	8	0						
"	27	"	H	2	2	5	2	6	2	6	6	6	9	6	13						
"	38	R. I. R.	H	2	2	4	11	6	1	5	14	6	4	6	5						
"	90	"	H	2	2	5	4	5	15	5	5	6	9	6	9						
"	11	B. P. R.	H	2	2	5	12	6	1	5	15	5	12	5	7						
"	17	"	H	2	2	8	4	8	10	9	2	9	10	9	12						
"	1	W. P. R.	H	2	2	5	7	5	14	6	2	6	3	6	3	5	8 $\frac{1}{2}$				
"	9	"	H	2	2	5	5	6	6	6	6	6	4	6	2	6	10				
"	58	Cross Wh. Wy. & Br. Leg.	H	1	"	5	1	5	15	6	2	6	2	6	1	1	1 $\frac{1}{2}$				
"	64	"	H	1	"	4	8	4	11	4	14	5	0	4	15		0 4 $\frac{1}{2}$				

Summary of Results, Pen vs. Crate. Weight, Development, Cost of Production, Profit from Sale, &c.

Group No.	Pen or crate.	Weight.				Cost of Production.										Returns from sale at 18c. per lb.	Profit on six chickens. Labour not counted.	Rations for 1 and 2 Groups. { Ground oats, 2 parts; ground barley, 1 part; corn meal, 1 part; mixed with skimmed milk. Rations for Groups 3 and 4. { Ground oats, 4 parts; ground barley, 2 parts; ground corn, 1 part; meat meal, 1 part; mixed with skimmed milk. Rations for Groups 5 and 6. { Finely ground oats, 4 parts; ground peas, 1 part; ground corn, 1 part; meat meal, 1 part, mixed with skim milk.
		At beginning of experiment.		At close of experiment.		Total increase in four weeks.		Chickens.		Food.		Cost to produce one pound of increase.	Total cost of production.					
		Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Value at 10c. per lb.	Initial Weight.	Amount consumed in 4 weeks.	Value at 14c. per lb.			Cts.				
1	Pen.	6	24	11	35	6	10	11	24	11	39	2.47	49	4½	2.96	4.60	1.64	
2	Crate.	6	22	15	33	6	10	1	22	15	39	2.29	49	4½	2.78	4.29	1.51	
3	Pen.	6	18	3	27	6	9	3	18	3	36	1.82	45	4½	2.27	3.56	1.29	
4	Crate.	6	18	10	25	15	7	5	18	10	36	1.86	45	6½	2.31	3.37	1.06	
5	Pen.	10	26	8	43	4	16	12	26	8	53	2.65	73	4½	3.38	5.62	2.24	
6	"	10	55	3	66	4	11	1	55	3	54	5.52	68	6½	6.20	8.61	2.41	

Results of the foregoing experiments permit of the following deductions :—

The pullets with one exception did not make as great gains as cockerels of the same age.

Old hens which are well fed require no further treatment to make them fit for killing.

The older the hen the more readily does she take on fat rather than flesh.

The cross-bred chickens, although fed on a more nutritive ration, did not make as much weight as pure bred ones.

The chickens which were loose in their pens with limited run, made slightly greater weight developments, at cheaper cost, than those in crates.

POULTRY BUILDINGS.

The construction of poultry houses varies much, first as to the materials used, then as to their size, shape and arrangements. For a farm poultry house, the arrangements and plans contained in this bulletin may not always be convenient to follow, but the general principles of their construction must always be the same.

In order that the fowls may enjoy the sunlight, the poultry house must have a southerly exposure. This point should not be overlooked, for a proper exposure is as necessary for the health of the fowls as suitable food.

Whatever be the shape decided upon, the poultry house must always be above the level of the ground in order to avoid dampness, which is so injurious to poultry.

It would be impossible to keep hens in cleanliness and health on a damp soil.

The farm poultry house may be built cheaply by using materials of low value in their construction.

The floor may be made of cement with a slight slope, so that it may be easily washed, or it may be made of small stones covered with sand, this latter being kept frequently raked. A cement floor is more easily kept clean, if covered with a thin layer of sand or with from four or six inches of litter, it has not, as some breeders assert, the fault of being cold for the feet of the hens. Besides, it has the advantage of being proof against vermin.

Of all wooden floors, a tarred floor is best, made of boards tarred on each side.

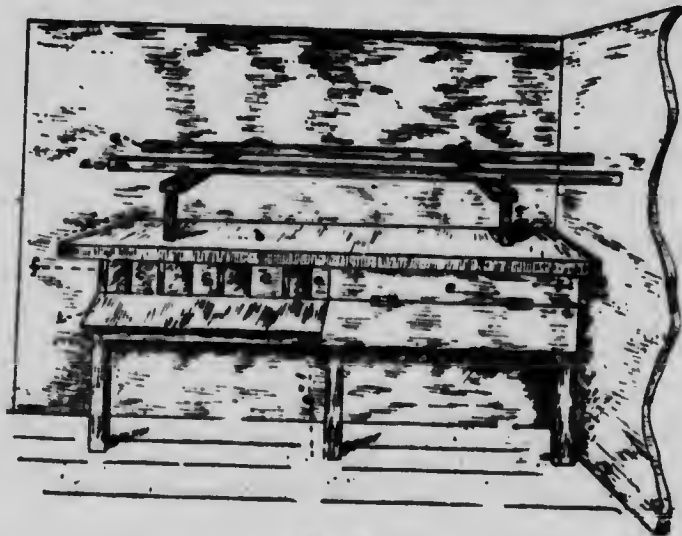


Fig. 43.

GENERAL MANAGEMENT.—The health of the fowls should be the first consideration. To ensure health the house must be well kept, clean, dry and well ventilated. If these essential points are neglected the keeping of poultry is likely to result in loss. Neglect

ed houses are sometimes met with where vermin swarm and where neither chicks nor hens can make healthy growth.

Ventilation must be adequate and in proportion to the size of the building and the number of fowls sleeping in the building. Each chamber must have a system of ventilation working so as to carry away all the air rendered foul by breathing.

These ventilators may be flues, self regulating window ventilators (see fig. 43), or sliding panes at the bottom and at the top of the main window sash. Such panes must be kept more or less open according to the need of ventilation. In this latter case it is advisable to cover the whole opening outwardly with cheese cloth or canvas to moderate the draught of the air coming in through these openings.

The draught passing above the heads of the birds cannot harm them. Whatever be the shape or the plan adopted, care must be taken that the temperature of the poultry house be not too high during the coldest period of winter. The great fault of breeders is to heat the poultry house too much, with the thought of increasing the productiveness of their fowls. At the Central Experimental Farm, the poullets (of general utility type) kept last winter in a cold house (fig. 50) gave the best results as to fertilization of eggs and vitality of germs in hatching.

The roosts in a poultry house should be removable; also nests for layers (fig. 43).

The roosts should be flat, and never higher than three feet from the ground.

The platforms under these, on which the excrement falls (b fig. 43, or a fig. 45) should be covered with a thin layer of fine or very dry sand, ashes or lime, which prevents the discharges from soiling the platforms and renders their removal easier, as it absorbs moisture.

Each nest must contain a small quantity of very fine cut straw or of oat chaff, and not of hay, to which chicken mites are very partial.

The poultry house should be kept regularly cleaned, the litter of straw renewed as soon as it is damp and cut up by the scratching of the layers.

The inside walls should be whitewashed twice a year, as well as the nests and the roosts. Besides, during the hot season of the year, the latter should be washed or sprayed with coal oil at least once a fortnight; in this way chicken mites will be kept away, or if present destroyed.

DETAILS OF CONSTRUCTION OF POULTRY HOUSES.

The figures Nos. 44 and 45 show plans of a farm poultry house with cold scratching shed and comfortable roosting rooms. No artificial heating is needed.

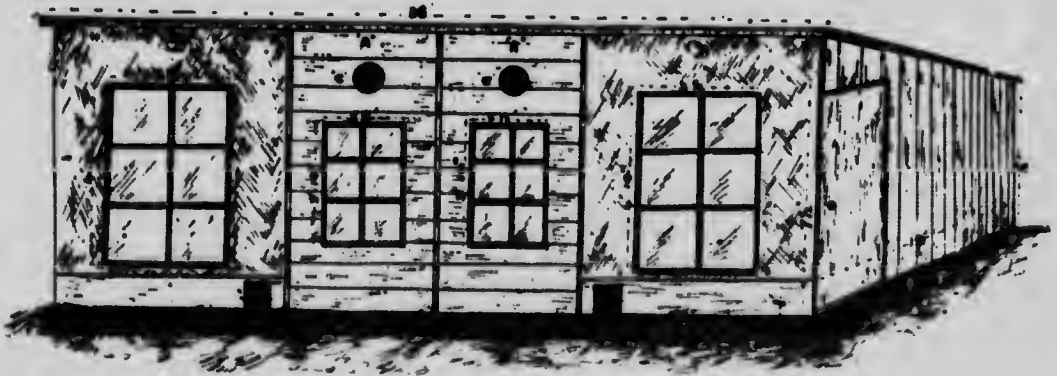


Fig. 44.

Accommodation.—This poultry house, or rather this double poultry house, should be 36 feet in length and 10 feet wide, outside measurement, and will accommodate thirty birds each, allowing for each hen six square feet of floor space, or twenty-six birds with seven square feet for each.

The beginner will find it more convenient and profitable to keep only twenty-six birds, or even only twenty-three, having thus each eight square feet. The hens need ample space in scratching for their food, and grain should be fed to the birds in this way while confined to the house.

The foundation must be made with sills, preferably of cedar, four inches square. For the frame, see building material, page 59.

Roosting Rooms—The roosting rooms (A A fig. 44 and 45) should be 8 feet by 10. The windows (see fig. 44) $2\frac{1}{2}$ feet wide by 3 feet 10 inches in height, should be double in order to protect the birds from cold and placed at 20 inches from the floor, so as to let as much light as possible fall on the floor of the poultry house. Each roosting room must be provided with a self-regulating ventilator (as shown in the plan c c fig. 44) also an opening of 10 inches by 12 by which the hens can pass from the roosting room to the scratching shed (c c fig. 45). In winter, these openings must be kept closed at night.

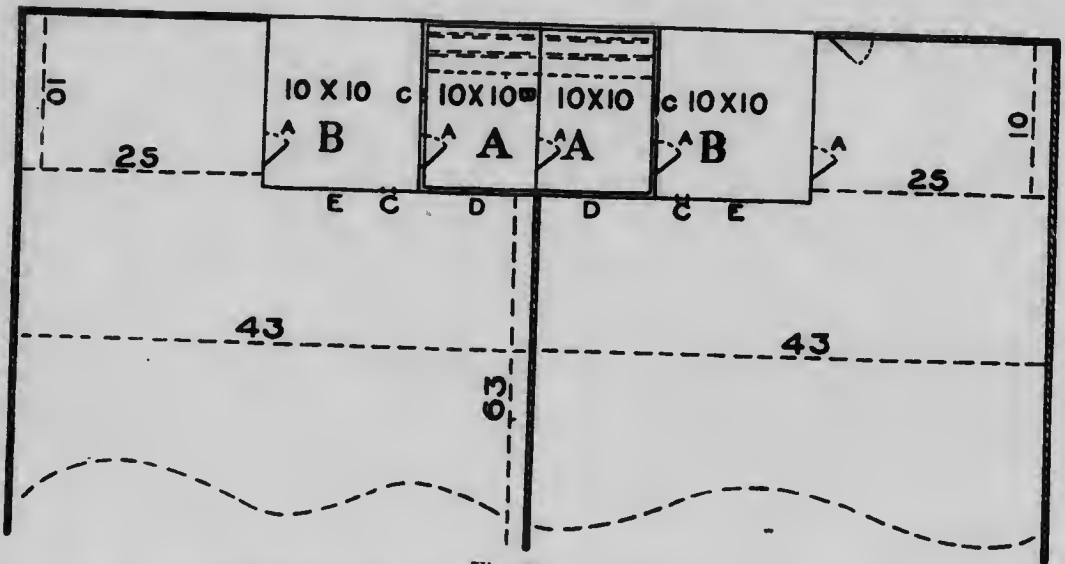


Fig. 45.

Walls—The four walls of the two roosting rooms should be of studding with two layers of building paper one on each side, then rough boards on either side of the studding, and the outside joints should be covered with battens of $\frac{1}{2}$ inch by 2 inches.

The partition between each roosting pen may be made of netting or of cotton; but care must always be taken to nail about two feet of boards at the bottom, as well as at the door, in order to prevent the birds from breaking through the cotton and worrying each other.

Nests—In order not to lose any room on the floor, the nests (c c c c fig. 43) should be placed 20 inches above it, with an entrance near the wall for the layers. They should be provided with a door at the back toward the roosting room for the collection of the eggs. They should be about 14 inches square. The platform and roosts (a a and b fig 43) should be above the nests. The windows should be double to protect the birds in severely cold weather.

During times of great cold, in order to give additional protection to the birds during the night, it will be easy to hang up a cotton cloth or some canvas in a frame hinged so that it can be lifted up to the ceiling during the day.

Scratching Sheds—The scratching sheds should be 10 feet by 10, built with scantling 2x3 covered outside with a single layer of inch boards with battened joints to correspond with the other parts. The front, which faces the south, should be covered with

oiled cotton fixed to the studding, and in each division there should be a window $3\frac{1}{2}$ feet wide by 4 feet 10 inches in height (see fig. 44) one foot above the floor. Below the windows it will be better to line with boards to give it the necessary strength.

Roof—The roof may be of shingles or specially prepared paper. If it is of paper, a thick layer of tar should be applied, and on it while still hot coarse sand or medium sized grit. A similar layer should be added every second year. The roof of the roosting rooms must, however, be made of double boards similar to the sides. The roof of the scratching sheds should be built with single boards.

Floor—Whatever material is used for the floor it must be at least six inches higher than the surface of the ground outside. It may be made of small staves covered with from four to five inches of sand, of cement or of tarred wood. No provision has been made for this in the list of material which follows:

List of building materials for the poultry house, 10 ft. by 36 ft. (Fig. 44.)

2 pieces 4 × 4 × 10 for end sills at \$16 M.....	\$ 2 00
2 " 4 × 4 × 13 for front and hind sills at \$16 M....	
4 " 4 × 4 × 12 " " " " " " " " " " " "	
13 " 2 × 3 × 7' 6 in. for front studs at \$16 M.....	
13 " 2 × 3 × 5 for hind studs at \$16 M.....	5 01
2 " 2 × 3 × 7 for gable studs " " " " " " " " " " " "	
2 " 2 × 3 × 6 " " " " " " " " " " " "	
14 " 2 × 3 × 12 for rafters " " " " " " " " " " " "	
19 " 2 × 4 × 11 " " " " " " " " " " " "	26 25
1,750 feet rough 1-in. boards at \$15 M.....	
60 pieces $\frac{1}{2}$ -in. × 2 × 12 battens at 4c. each.....	2 40
4 " 2 × 3 × 8 roosts.....	0 25
2 sashes for roosting chamber.....	1 80
2 double sashes for roosting chamber....	1 80
2 sashes for scratching shed.....	3 60
5 squares, roofing paper.....	9 25
2 paper rolls.....	1 40
Sundries, nails, hardware, &c.....	4 25
Labour for 10 days at \$2.50 per day.....	25 00
	\$ 84 01

or \$2.33 per running foot (floor not included).

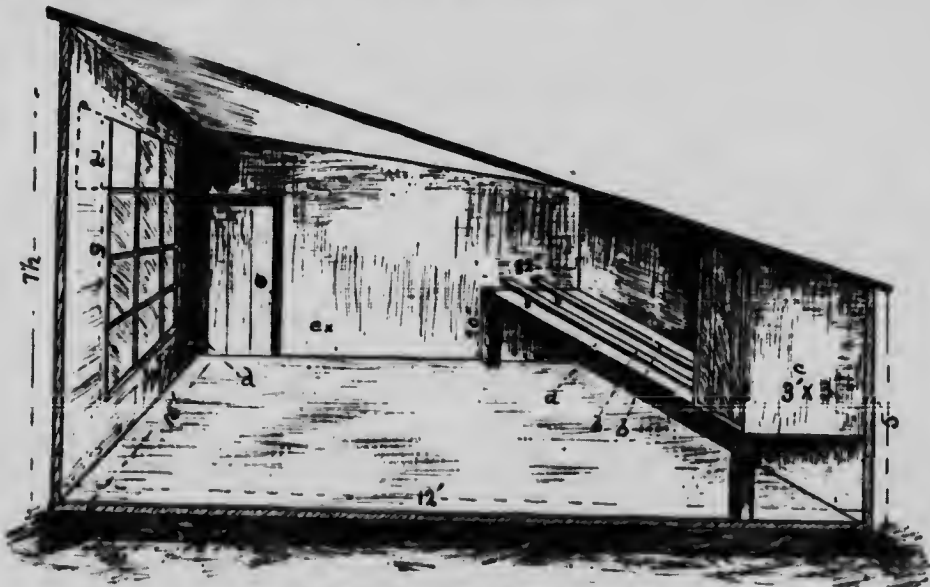


Fig. 46.—The Single Poultry House.

The Single Poultry House.—(Fig. 46) is 12 feet wide by 15 long, $7\frac{1}{2}$ feet high in front and 5 at the back. This building has no separate scratching shed.

The size inside is 11 feet by 14, a space sufficient for 22 hens, allowing them seven square feet for each, or for 26 hens, with six square feet for each.

As in the plan (Fig. 44) this poultry house is built on scantling.

The roofs, walls and windows are double, built in the same way as the roosting rooms AA of the plan No. 45.

The platform supporting the roosts (Fig. 46) must be 11 feet in length by 2 ft. 8 in. in width and 20 in. above the floor; the roosts (BB Fig. 46) 6 in. higher, and $2\frac{1}{2}$ in wide by 2 in. thick.



Fig. 47.

The nests (Fig. 47), five in number for heavy breeds, must be placed 20 in. above the floor and fastened to the wall (x Fig. 45) by means of a wooden clamp (Fig. 49.) Both nests and roosts must be movable.

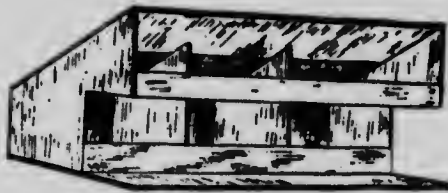


Fig. 48.



Fig. 49.

By the side of the roosts there should be a compartment three feet square (c Fig 46) for the male bird which must be removed from the layers as soon as the breeding season is over. The windows are 4 feet by 5. The ventilation is provided for by two openings in the window, one at the top the other at the bottom, by means of two sliding panes (dd Fig. 46). These openings must be covered outside with cotton cloth or canvas.

2 pieces 4 × 4 × 12 end sills at \$16 M.....	}	\$	1 15
2 " 4 × 4 × 15 front and hind sills at \$16 M.....			
6 " 2 × 3 × 7½ studs at \$16 M.....			
6 " 2 × 3 × 5 " "			
4 " 2 × 3 × 7 " "			
2 " 2 × 3 × 6 " "	}		5 30
2 " 2 × 3 × 15 " "			
2 " 2 × 3 × 15 " "			
2 " 2 × 3 × 12 " "			
7 " 2 × 4 × 17 rafters "			
1,250 feet rough boards at \$15 M.....			18 75
45 pieces ½ × 2 inch battens, 4c.....			1 80
1 double window.....			1 90
2½ squares roofing paper.....			4 16
Sundries, nails, &c.....			2 45
Labour, 6½ days at \$2.50 per day.....			16 75
Total.....		\$	52 26

or \$3.46 per running foot (floor not included).



Fig. 50.—A double poultry house with its runs. Central Experimental Farm, Ottawa.

The Poultry House (fig. 50) measures 12 feet in width by 40 in length; it is 5½ feet high in front and 7 at the back, with a passage 3 feet wide behind the two roosting rooms (a fig. 51). It will accommodate 32 hens on each side, allowing 6 square feet to each, or 28 hens with 7 square feet.

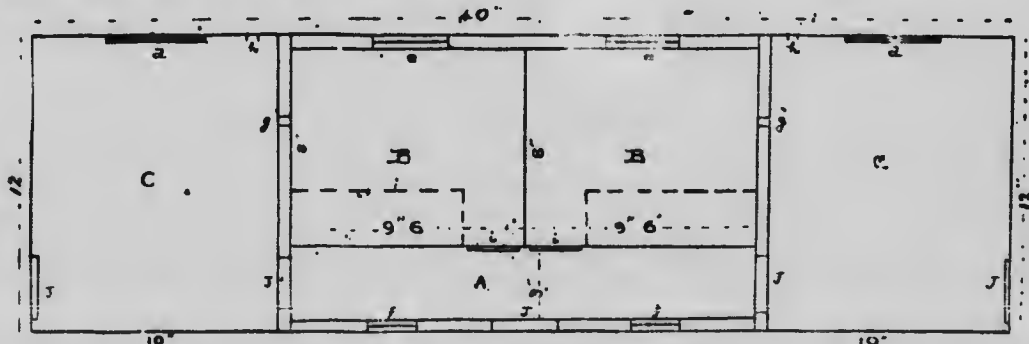


Fig. 51.—Ground Plan of Poultry House Fig. 50.

Roosting Rooms and Scratching Sheds.—The two roosting rooms (bb fig. 51) are 8 feet wide by 9½ feet long, inside measurement, and are divided in the same way as those of poultry house, fig. 44, page 57.

The scratching sheds (cc fig. 51) are 10 feet by 12 outside. The four walls of the two roosting rooms and those of the scratching sheds are built in the same manner as those of plan (fig. 44), excepting the front part, that towards the south, which is covered with one ply of rough boards with battens. There is a window in each scratching shed (dd fig. 51) of 3 feet 8 inches by 5½ feet, hung by means of hinges so as to open inward. Those of the roosting rooms (ee fig. 51) should be double and 2½ feet by 3 feet 10 inches. There must also be provided a frame covered with wire netting to fit into the window frame to prevent the birds from getting out when the window is opened.

Two other small windows (ff fig. 51) of 1½ feet by 2 should be placed in the passage way on the north side of the roosting rooms.

The doors (jj fig. 51) 2½ feet by 6½ at each end of the passage, are to reach each scratching shed and another of the same size in the middle of the poultry house on the north side for entering the building.

An opening (gg fig. 51) of 10 inches by 14 between each scratching shed and roosting room to allow the fowls to pass from one to the other. Another of the same size opening into the outside runs should be on the front of each scratching shed (hh fig. 51). These openings must be provided with sliding doors so that they may be closed if required.

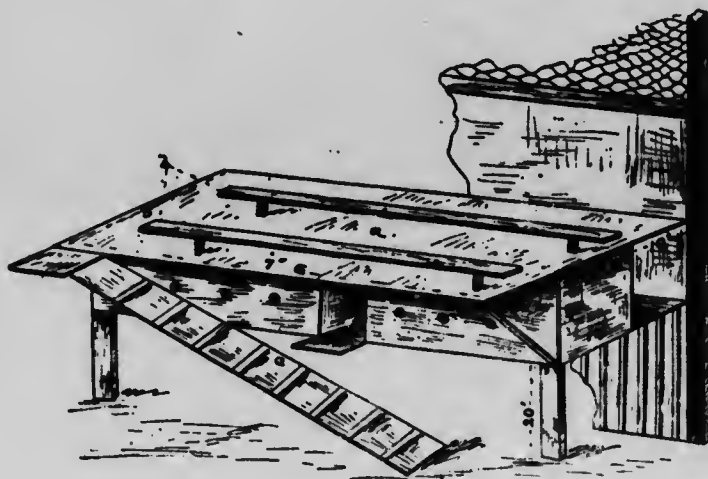


Fig. 52.

The roofing may be of shingles or of tarred paper prepared for that purpose, as described for plan (fig. 44). The ceiling above the passage and almost all of the roosting rooms must be 7 feet above the floor, so as to leave a little loft above the roosting rooms for straw for litter.

The nests (fig. 52 and 53) are about 14 inches square and 20 inches above the floor. The platform (a fig. 52) 3 feet wide by 7 feet 6 inches long, the roosts (b fig. 52) of the same length and 22 inches by 2.

For heavy breeds, in order to enable the birds to reach the roost more easily, a board (c fig. 52) to serve as a step should be fastened by means of hinges either to the partition wall or to the platform.

The doors (bb fig. 53) are provided to render easy the cleaning from the passage of the platforms and (cc fig. 53) for the collection of the eggs. The trough (d fig. 53 is placed 6 inches above the floor.

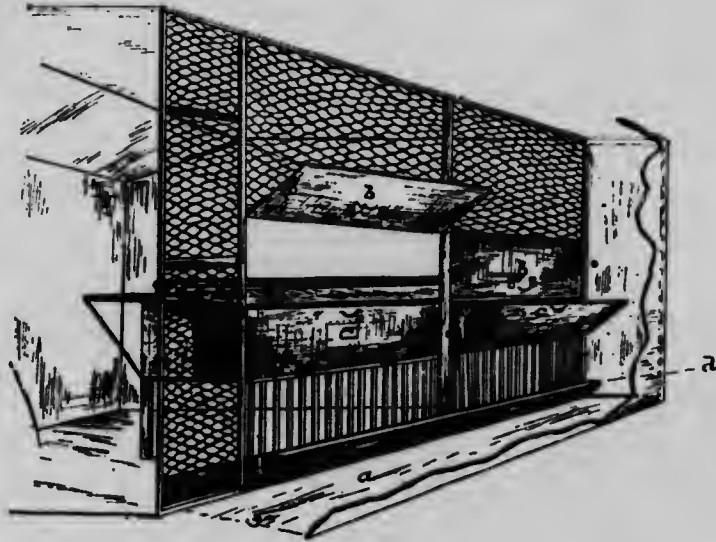


Fig. 53.

Accessories—Each pen must be provided with the following accessories: 1st, a drinking fountain placed from 4 to 5 inches above the floor; 2nd, a small box nailed to the wall about 5 inches above the floor to contain grit, lime, &c.; 3rd, a trough for the mash placed about the same height; 4th, if the floor is of cement or wood, a dust box filled with dry sand placed on the floor in such position as to receive the sunlight.

List of Building Materials for Poultry House 12 x 40 feet. (Fig. 50.)

2 pieces 4 x 4 x 12 end sills.....	\$16 M	}	\$2.30
6 " 4 x 4 x 14 front and hind sills.....	"		
14 " 2 x 3 x 7 hind studs.....	"		
14 " 2 x 3 x 5½ front ".....	"		
6 " 2 x 3 x 12 end ".....	"	}	\$3.25
4 " 2 x 3 x 13.....	"		
2 " 2 x 3 x 14.....	"		
6 " 2 x 3 x 13.....	"		
2,000 feet rough boards at.....	\$15 M		30.00
64 pieces ½ x 2 x 12 battens.....	4c. each		2.66
21 " 2 x 4 x 11 rafters.....	at \$16 M	}	3.80
4 " 2 x 4 x 6 ".....	"		
12 " 2 x 3 x 12.....	"		1.15
6 squares paper.....	\$1.85		11.10
2 rolls building paper.....			1.40
Sundries, hardware, &c.....			7.79
Labour at \$2.50 per day, 12½ days.....			31.30
Total.....			\$94.75

or \$2.37 per current foot (floor not included).

The cost of the building of poultry houses, Figs. 44, 46 and 50, may be more or less according to the price of materials and labour ; for many farmers may be able to build them themselves. In estimating for these buildings the lumber is all used rough.

MOVABLE SHELTERS.

Such shelters may be used not only to house chickens from two to two and a half months old till fattening time or till autumn, but they may also be used with advantage for birds intended for breeding, which it is wished to keep away from the winter poultry houses.



Fig. 54.

It may be built of scantling, 2 by 2 inches and with rough $\frac{1}{2}$ -inch boards. The roof and floor must be of 1-inch boards, and the rafters, 2 by 4 inches. The roof may be covered with tarred paper and finished in the same way as that of poultry house, fig. 44.

This shelter can house 75 birds during the night. The cost of materials for such a structure is about \$6.

The shelter, fig. 54, is 10 feet long by 7 feet wide, $5\frac{1}{2}$ high in front, above the floor, $2\frac{1}{2}$ at the back ; and the floor 16 to 18 inches higher than the ground, so as to shelter the birds under the building from rain, cold winds or a hot sun.

The doors, *a, a*, are 18 inches by 3 feet 8 inches ; *b*, 2 feet 3 inches by 4 feet 2 inches. The opening, *c*, is to let the chickens in from under the shelter.

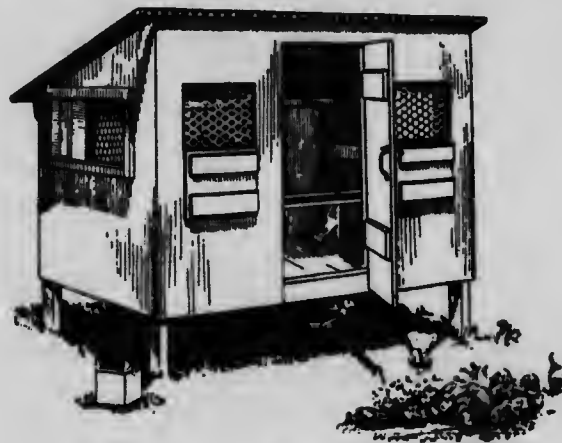


Fig. 55.

The shelter, fig. 55, is 6 feet long, $4\frac{1}{2}$ wide, $4\frac{1}{2}$ high in front, above the floor, 3 feet 4 inches at the back, built in the same way as the shelter, fig. 51 ; or it may be covered with cotton cloth instead of boards. The floor is 14 inches above the ground. This will house 24 chickens. The materials necessary for such a building will cost about \$4.

The small shelter, fig. 56, may be built in the same way as fig. 54. This is 4 feet 2 inches long, 2 feet 10 inches wide, 4 feet 6 inches high in front, above the floor, and 3 feet 4 inches at the back. The floor is 12 inches above the ground. This shelter will house 15 chickens. Built of lumber, the cost of the materials will amount to about \$2.50.

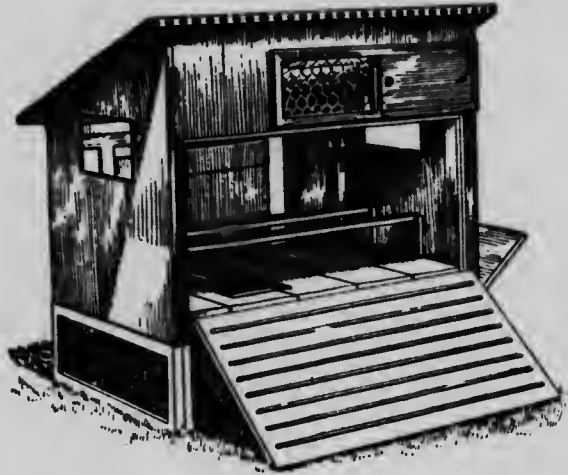


Fig. 56.

MOVABLE POULTRY HOUSES.

Poultry houses are sometimes built on rollers so that they can be moved from place to place on the farm. Where this can be done conveniently it is a great advantage to the fowls to be put into the fields after harvest, or into gardens or orchards, where they

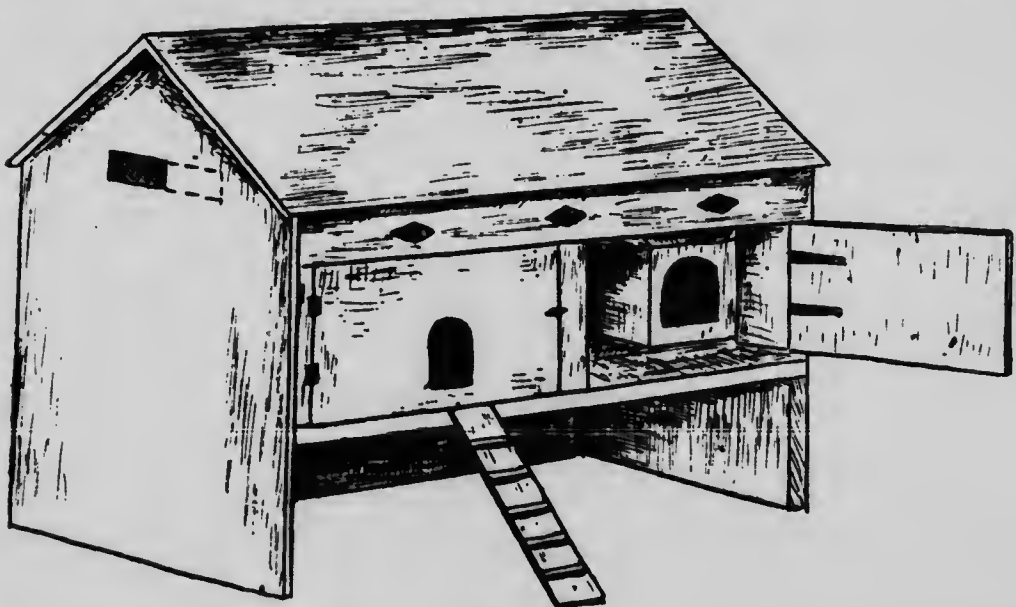


Fig. 57.

pick up fallen grain which might otherwise be wasted and consume considerable quantities of insects and weed seeds. The fowls thus benefit the farmer by destroying noxious insects and by picking up a large part of their own living, while a run over fresh ground and a larger area promotes the growth and vigour of the flock.

Such a poultry house will be useful to amateur poultry breeders who have not much space available; it can be conveniently placed in a yard, a garden or an orchard. A shelter arranged under it protects the fowls from the rain, the sun or the wind; inside are two roosts and a nest. To make cleaning easier, a door may be added at the back. It should be built with thin boards and covered with either boards or cotton.

THE POULTRY RUNS.

The hen has a wandering disposition; she needs exercise. In order to thrive she must have a certain liberty, ground enough for her to run about while picking here and there such food as is suited to her taste.

As most farmers own extensive grounds and seldom more than one breed of fowls, poultry raising is for them easy; but such as have to breed birds in small runs and on limited ground, will be under greater disadvantage and will probably suffer from poor fertilization and lack of vitality of the germs in the eggs used for hatching. With less than a hundred square feet (ten feet by ten) of land for each fowl, the soil would soon be infected by the droppings, and every particle of green vegetation would be eaten or destroyed. In such case, the ground must be purified by being turned over every month with a spade especially during summer, as the droppings soon contaminate the soil. It is advisable when turning the soil to sow in it seed such as barley, oats, wheat, &c. The hens exercise themselves scratching and find the germinated seeds which they relish very much.

Such sanitary precautions are most important and necessary especially for stock that seldom go outside of the run.

To keep fowls in a healthy condition they should have access to green grass, which they will eagerly consume. When the run is large and the grass well grown, the fowls do not destroy it, and, their droppings scattered over a wide area are not injurious.

A bare spot must always be kept, exposed to the sun where sand will be spread, where they will go and dust themselves.

Shrubs or trees should be planted in the runs to provide sufficient shade for the fowls during hot days. The run should be kept clean from straws, feathers or any other rubbish which would interfere with the growth of the grass.

FENCES.

It is necessary that fowls kept in a small enclosure should be safely fenced, especially where there are several runs on the same piece of ground.

Fences are often made with boards or laths, eight or ten feet high, the idea being that this height is necessary, and that this is a good form of enclosure.

It is, however, more costly than is necessary, and is sometimes unsightly, and not easy to keep in repair.

Where space is limited, more profit will be found in keeping a breed of quiet habits such as one of the general utility type. The breeds of a roving disposition (the type for egg-laying) will suit those better who have a fairly large ground. However, with a very simple and cheap fencing (fig. 58 and 59) any breed may be kept. It may be made with netting or laths and must be from 5 to 6 feet high. Where wire netting

is used the posts must be about a foot longer, so as to admit of the fastening of that part of the netting above the cross bar.

(1.) Each scantling should be 12 feet long and be held by posts (fig. 59) 6 or 8 feet apart, 4 inches square or round and 6 feet long, sunk 2 feet down into the ground.

(2.) At the bottom, in order to protect the birds within from the wind and especially to prevent the breeding males from fighting, the fence must be boarded up to not less than 20 inches from the ground (d fig. 58).

(3.) The upper bar (cc fig. 58 and 59) should be 10 or 12 inches lower than the top of the fence. In this way the birds will not fly over it, unless very much frightened, as every time one tries to fly over a fence it usually stops on the rail or upper bar. When it does this it is then unable to reach the top of the fence with its feet, and will shortly fall back within the inclosure. After a few useless attempts it will generally remain quiet.

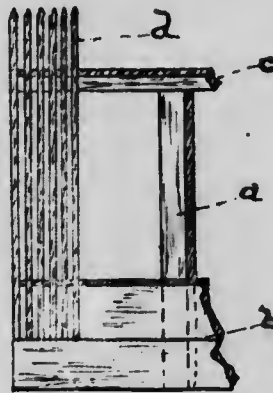


Fig. 58.

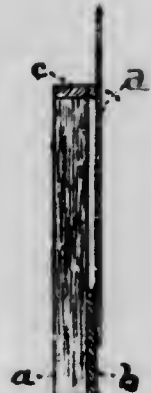


Fig. 59.

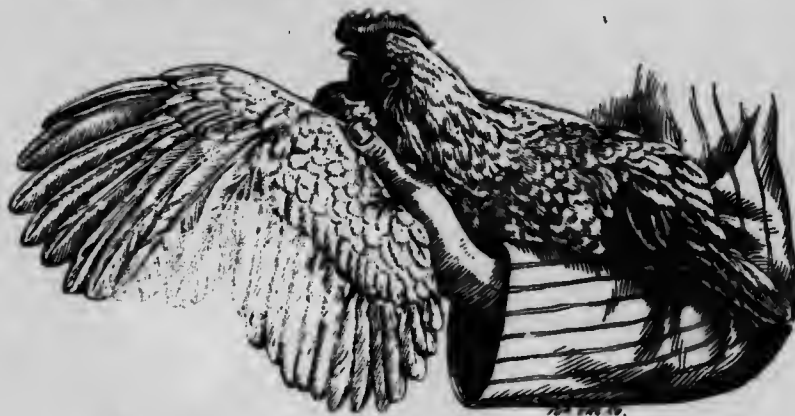


Fig. 60. How to hold the bird and the wing to cut the fly-feathers.

It is also very easy to keep the most restless breeds and varieties in small runs by means of fences such as those here described, by cutting the fly-feathers of only one



Fig. 61.

wing. Figure 60 shows how to hold the bird and the wing for this operation, figure 61 shows the wing when cut, and figure 62 the wing when cut and closed and pressed against the body of the bird. This can be done without any noticeable disfiguration of the wing.



Fig. 62.

ENCLOSURE FOR A POULTRY HOUSE.—To provide fowls with the means to take sufficient exercise in the open air during the summer months, and so that they may have green grass so desirable for their subsistence, they should when penned have a space of not less than 100 square feet, that is 10 feet by 10 for each fowl. Each run to accommodate comfortably the 30 hens that may be housed in the building shown on figure 44. should have an area of about 3,000 square feet, or say 43 feet wide by 63 feet long, including the small places shown on each side of the building on figure 45.

Should several such poultry houses be required, when fowls cannot be given unlimited run, it will be better to build them about fifty feet apart. Such a space between each building is desirable to avoid epidemics which may occur, and also to provide a more suitable division of the runs. If the poultry houses followed each other in a straight line without any interspace, the runs would then be too long and narrow, and with such runs the hens do not always care to roam to the furthest end.

GENERAL UTILITY TYPES AND STANDARD FOR JUDGING.

A general utility type must possess the following qualities: excellence in egg-laying, flesh-producing, must be a good sitter, and of a quiet disposition. The general characters are:—

Standard Weight.—Cock, 7 to 9 pounds; hens, 6 to 8 pounds.
Carriage.—Erect, gentle and graceful.

Head.—Medium size, rather round than long. *Beak* (1): Short, curved, strong, yellow or horn colour. *Comb* (2): Medium size, single or double. *Eyes*: Large and bright. *Wattles* (4): Medium size, equal, rounded, of a fine texture. *Ear-lobes* (5): Red, well developed and even.

Neck (6).—Length well proportioned, moderately arched; shorter and more compact in the female.

Breast (7).—Bulging, wide, deep. *Breast-bone* (17): Long and straight.

Back (8).—Broad, ordinary length, concave in profile toward the rump; less so in the female. *Shoulder and Saddle*: Broad.



Fig. 63.

1 Beak. 2 Comb. 3 Face. 4 Wattles. 5 Earlobes. 6 Neck. 7 Breast. 8 Back. 9 Saddle. 10 Saddle feathers. 11 Sickles. 12 Tail coverts. 13 Main tail feathers. 14 Wing-bow and wing-coverts, forming wing-bar. 15 Secondaries; wing-bay. 16 Primaries or flight-feathers. 17 Breast-bone. 18 Thighs. 19 Shanks or legs. 20 Spurs. 21 Toes.

Body.—Broad, compact, deep, rather long and round.

Wings (14, 15, 16).—Medium length, well folded and pressed against the body.

Tail (11, 12, 13).—Rather short than long, carried high and sickles graceful.

Legs (18).—Short, thick, well apart, and thickly clothed with downy feathers. *Shanks*

(19): Rather short, without feathers, firm, of a fine yellow or pinkish white colour.

Toes (21)—Strong, four on each foot, straight and of same colour as the shanks.

Bony frame—Medium size.

Plumage—Close, fluffy and richly downy.

Skin—Fine, soft, yellow, white or pink colour, the last two being preferred.

The General Utility Types are: Plymouth Rocks, Orpingtons, Wyandottes, Faverolles, Dorkings and other breeds or crosses close to these types.

Fowls of this type have a special aptitude for egg production, are but little broody, and the flesh of some is inferior in quality. They are of a restless nature. Their general features are:

TYPES FOR EGG LAYING.



Fig. 64.

Standard Weight—Cock: $5\frac{1}{2}$ to 7 pounds. Hen: 4 to 6 pounds.

Comb, Face and Wattles (2, 3, 4)—Bright red, an indication of a good constitution and good health. Look and carriage bold.

Head—Short, fine. **Beak** (1): Short, moderately curved, yellow, white or black. **Face** (3): Red and smooth. **Eyes**: Large, bright, red or bay-coloured. **Comb** (2): Single or double, of medium size, without folds or wrinkles, texture fine. **Wattles** (4): Moderately long, well rounded, thin, less thick in the female. **Ear-lobes** (5): Dull white, soft, smooth, round or almond-shaped and as well developed as possible.

Neck (6)—Long, well arched; plumage thick, covering the shoulders well.

Breast (7)—Round, deep, full.

Body—Long, cone-shaped, deep and plump in the female; pelvis broad; abdomen large and pendulous, abundantly clothed with downy feathers.

Plumage—Close, thick and bright-coloured.

Bony Frame—Rather small than large.

Back (8)—Medium length, with short concavity down to the tail.

Wings (14, 15, 16)—Ample and well folded.

Tail (11, 12, 13)—Well feathered and raised. **Larger Sickles** (11): Well arched.

Coverts (12): Many and silky.

Legs (18)—Free, medium length and thickness, well apart.

Shanks (19)—Rather long, without feathers, white, yellow or black; the last two colours preferred.

Toes (21)—Of the same colour, straight, four in number on each foot.

Skin—Soft, tender, white or pink.

The best laying breeds are: White Leghorn, Black Minorca, Black Hamburgh; other varieties of Leghorn and other breeds or strains derived from these.

GENERAL TREATMENT OF POULTRY, INCLUDING DISEASES, INJURIES, &c.

Diseases often come from the poor constitution of the birds, but oftener yet from the unclean and damp state of the poultry houses and of the unsanitary condition of the soil, deficient ventilation of the buildings and the crowding of the birds.

PREVENTIVE MEASURES.

(1) *Site of the Poultry House.*—Poultry houses should have a southerly exposure so that the birds may have the full benefit of the sunlight, for disease is seldom seen where the sun shines. Poultry houses should also be placed where they are sheltered from north winds, which are always injurious.

(2) *Green Vegetation.*—Fowls when perched during the summer should always have an abundant supply of green food.

(3) *Shade.*—Shrubs, and also trees, should be planted in poultry runs so as to give sufficient shade to the birds during the very hot days of summer. Fowls should go to the poultry house only to lay and to roost.

(4) *Cleanliness.*—At least twice a year roosts and walls should be whitewashed; this is the best means to destroy the parasites, which in spite of all cleanings are apt to infest the stock and building.

The soil in the runs should also be turned over from time to time to bury the excrement deposited on it.

EGG BOUND.—This trouble is frequently the result of too much crowding, or of feeding grain exclusively, which causes an inflammation of the oviduct. The lack of lime in the food may also result in the breaking of the eggs in the oviduct; the preventive measures are of very easy application.

Symptoms.—The bird is distressed, has a capricious appetite, curves its back and remains standing or lying on its belly, which soon swells; diarrhoea sets in; finally after four or five days the bird dies; it is found on its back, the feathers of the abdomen and of the rump ruffled. Already before death, it may be seen that the skin of the belly and around the anus is red, swollen, distended and sore; sometimes even by inserting a finger in the anus the stopped egg or eggs may be felt.

Treatment.—In the first place give the bird a teaspoonful of castor oil, and, if there is no passage of the egg, give through the anus an injection of sweet oil, followed, if need be, by an application of belladonna ointment. The diet must be very cooling, composed of herbs, lettuce and dampened bran; the bird should be kept quiet in a small enclosure.

FRESHLY LAID EGGS WITH STALE TASTE.—This trouble occurs sometimes with excessively fat hens; when the egg cannot pass freely through the oviduct, which is almost obstructed with fat, it is retained in this organ sometimes for two or three days, and, if it is fertilized, the animal heat is sufficient to start decomposition. At that stage only the yolk is formed; then, when the yolk becomes surrounded with white and later with the shell, and is finally laid, though freshly laid, it has a stale taste.

As a preventive treatment, lessen the ration and remove the male bird from the layers.

HERNIA OF THE OVIDUCT.—Another affliction, which has the same causes as that of egg bound; is a hernia of the oviduct due to catarrh: the abdomen becomes swollen and hard posteriorly. The skin of the belly is stretched, hot and shining. A mucous discharge which spreads and dries up around the rump, is an accompaniment of this disease; the irritation is strong enough to bring about the falling of the feathers.

Symptoms.—The hens drag their body on the ground ; they eat and lay pretty well, but appear sickly among the others.

Treatment.—It is rather difficult to cure this affection ; but the effects may be corrected by a cooling diet and by the application round the rump of a pomatum composed of 5 parts of sweet almond oil and 25 parts of glycerin ; this mixture is brought to a lukewarm temperature, when 5 parts of powdered starch is to be added.

APOPLEXY.—A rather common disease in all classes of poultry when kept closely penned and liberally fed ; due to a congestion of the brain.

Symptoms.—The eyes of the bird are dull, its head hangs down, the wings drag behind ; a drivel runs from the beak, the comb becomes purple and black, the neck becomes stiff and when unrelieved the disease grows worse until the bird falls down and dies.

Treatment.—In the first place, the bird should be bled, either on the comb by means of a needle, or by cutting off a nail of each foot near its base, or, in the case of web-footed birds, by opening a vein in the webs of the feet ; the treatment is completed by drenching the head from time to time with cold water until the disease abates.

For a few days, feed the bird with dampened bran and skim milk.

GAPES.—This disease is due to the presence in the bronchial tubes of very thin thread-like worms.

Symptoms.—As the disease increases, the bird becomes feeble, its appetite becomes less, there is coughing, ruffling of the feathers and increasing emaciation. Breathing is heavy and becomes more and more laborious, till death comes from choking after two or three days.

Treatment.—This consists in fumigating twice a day with tar, camphor or tobacco. The material chosen is placed on a vessel containing live coals ; then the vapours that rise are concentrated in a tight fumigating apparatus (see fig. 65), each fumigation must last from twelve to fifteen minutes ; they must be continued until all the symptoms disappear.

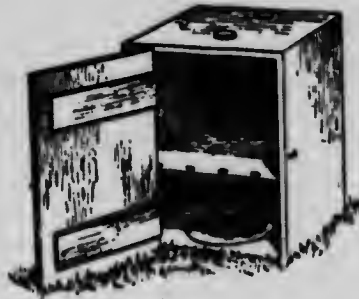


Fig. 65.

Some writers recommend mixing ground garlic in the mash ; tonics are also recommended.

CHOLERA.—Fowl cholera is one of the most contagious diseases ; it is caused by the presence in the blood of a special infective microbe. The disease is very rapid in its progress and is nearly always fatal.

Symptoms.—The bird affected has its feathers ruffled, its wings low, is dejected, and appears to be very thirsty. The discharges are always foamy or glistening.

Treatment.—All treatments for this disease tried have so far failed. As soon as the disease breaks out in a poultry yard, the healthier birds should at once be removed

The poultry house must be disinfected, the walls, floor, roosts, and all the utensils used by the birds must be washed with milk of lime. The diet during the epidemic should be composed of vegetables to which bran is added.

DIPHTHERIA.—This disease spreads rapidly, and if not checked kills in two to four days all the birds affected. There should be no hesitation to kill and bury or burn the diseased hens, if they are not of high value; for diphtheria alone is enough to destroy the largest and most thriving flock.

Symptoms.—When the sick bird is examined, it is easily seen that the beak and the tongue are becoming coated with whitish, more or less thick, false membranes, that the nostrils are stopped up with a mucous secretion; breathing is laborious, the bird is drowsy, its feathers ruffled and its gait tottering.

Treatment.—Smear the beak and throat with a feather dipped in a mixture of vinegar, one part, and ordinary honey, two parts, brought to a gentle heat to facilitate their thorough mixing.

Another treatment is as follows: Remove the above-mentioned false membranes with a damp and lukewarm sponge, dry the sores with the same sponge and burn them with a small silver nitrate pencil; when new false membranes form, smear the beak and throat with a solution of Carle Seiler's tablets,* one tablet dissolved in two ounces of water. Repeat every other day, one day burning, the next smearing.

The diseased birds must be removed from the flock, the water and litter changed and the poultry house disinfected.

ANEMIA.—This disease attacks all poultry birds; it is due to bad sanitary conditions and bad feeding.

Symptoms.—Loss of appetite, general emaciation, excessive prostration, paleness of the comb and presence of pustules on the head or the throat wattles.

Treatment.—The treatment consists in keeping the poultry house quite clean, protecting the fowls from the weather, giving nourishing food and removing the weak ones from the flock.

CONSTIPATION.—This is rather a frequent ailment in poultry, caused sometimes by a too liberal feeding of such food as oats, buckwheat, &c.

Sitting hens and good laying hens often suffer from it.

Symptoms.—The bird makes efforts to discharge its droppings, which are drier and harder than in normal conditions, forming round, chalky masses. This trouble is sometimes accompanied by depression and loss of appetite.

Treatment.—The treatment consists in giving laxative food, such as green vegetables mixed with bran. A spoonful of olive oil two or three days in succession has an excellent effect. It is advisable for geese to administer five or six grammes of sulphate of soda in a tablespoonful of water.

DIARRHŒA IN YOUNG CHICKENS.—There are two kinds of diarrhœa—bilious diarrhœa, which often spreads rapidly, and chalky diarrhœa.

The causes of bilious diarrhœa are: Damp soil or a damp poultry house and unsuitable food.

Symptoms.—Green, almost liquid droppings.

Treatment.—Taken in time, diarrhœa is easily checked by a change in the diet, by giving heating grains—such as ground oats and buckwheat—a mash composed of hard-boiled eggs finely minced, cooked rice and cut and cooked vegetables. A little powdered

* Carle Seiler's tablets are made as follows: Take sodium bicarbonate, sodium borate and sodium chloride, of each, 60 grains; sodium benzoate, 4 grains; sodium salicylate, 4 grains; oil of eucalyptus, 2 drops; thymol, 2 grs.; menthol, 1 gr.; oil of wintergreen, 1 drop. Mix and make 12 tablets.

sulphate of iron (green vitriol) completes the treatment; about half of a small teaspoonful in a quart of water. Allow the affected birds to drink freely of this. The sick birds must, of course, be kept in a healthy and dry place, and should, if practicable, be kept apart from the other chicks.

CHALKY DIARRHŒA.—Is very common among chickens, especially where they are produced on a large scale, and where sanitary conditions are neglected.

Symptoms.—The chief characteristic of this disease is that the droppings have a chalk-like appearance, and by hardening they finally obstruct the passage and cause inflammation.

Treatment.—The remedy for this disease is rice water to which some sulphate of iron is added, about half a small teaspoonful to a quart of water. Feed also a mash such as is recommended for bilious diarrhœa, viz., hard-boiled eggs, cooked rice and vegetables.

Another remedy recommended is rice, 10 grammes; starch, 20 grammes; laudanum, 20 drops; water, 1 quart. The rice is boiled in water, the liquid is poured off on the starch already mixed with a little cold water, and the laudanum is added.

The obstruction of the anus in chickens may be released with a little brush soaked with lukewarm sweet oil.

BUMBLE-FOOT.—This is a swelling caused by a sprain often brought about when alighting from roosts that are too high above the floor.

Treatment.—The remedy consists in making with a scalpel, provided matter is formed, a cross-shaped opening under the foot or between the toes, pressing the pus out, washing the wound frequently with warm water so as to keep it thoroughly clean. The sick bird must also be kept on a soft bed in a restricted space without roost until the cure is complete.

FRACTURE.—Fractures are detected by the difficulty of movement of the injured limb and pain.

They heal naturally if the bones are properly kept in place.

Treatment.—The parts are kept in their place by means of one or two pieces of goose quill split lengthwise or a few splinters of thin cardboard applied on the broken bone and tied securely with thread. The limb will usually be healed in a fortnight. The injured bird should be kept apart in a quiet place.

SCALY LEGS.—This is an unsightly condition of the legs and toes of fowls. It is caused by damp and filthy quarters.

Symptoms.—The legs and feet are covered with grayish spots, which widen, forming rounded scales; these become raised and bleeding ensues; the birds walk and stand with difficulty.

Treatment.—Rubbing with pure coal oil every two or three days.

WEAK BONES OF YOUNG CHICKENS.—This affects particularly [chickens raised in captivity; those running at large rarely suffer from it.

Although receiving abundant and easily digested food, the bony frame of chicks raised in captivity does not always develop properly when the food is deficient in phosphates; they make too much flesh in proportion to the bone formed, and these, being too weak, bend under the weight of flesh which they bear.

The general weakness affects not only the feet and legs, it is often seen elsewhere, in humpbacks, curved breastbones, &c.

Such imperfections may be prevented by mixing with the mash for the chicks a small quantity of bones finely ground. Increase the quantity given gradually as the chickens grow.

INFLAMMATION OF THE INTESTINES.—This inflammation is usually associated with diarrhoea or dysentery and usually affects full grown birds.

Symptoms.—The bird is moping, scarcely eats, the feathers are ruffled, and the wings droop; the fœces emit an unpleasant odour.

Treatment.—Taken early, the disease is treated with laxative drinks, healthy and cooling food. Milk in which is dissolved a small quantity of Epsom salts (sulphate of magnesia) a teaspoonful to a pint of water, a little bicarbonate of soda (baking soda) mixed in the same proportion may be given twice or three times a day. The sick birds should be isolated.

EGG EATING.—The chief causes are the want of limy matter in the food, close confinement, lack of exercise, and nests too much exposed to light. This habit is also sometimes induced when eggs are laid without shell or with very thin shells and broken in the nests.

Treatment.—Give the layers plenty of exercise, fresh air and food proper for egg-making, see also that they have dark nests.

MOULT.—This critical period when the feathers are renewed is generally in July and August. Some hens lose their feathers very slowly, taking several weeks, others moult in four or five days. The latter are to be specially watched. This crisis is sometimes checked by certain conditions of cold and damp weather, in such instances the new feathers remain for a longer or shorter time within their cases, giving the birds a very odd and stunted appearance. Excellent results are obtained by the use of stimulating food, such as a few hemp seeds, meat scraps, crushed green bones or animal food mixed with bran. The birds must be kept in warm and dry quarters.

OPHTHALMIA.—Inflammation of the eyes; filthy and damp poultry houses are generally the causes of this disease. It is often complicated with diphtheria. It is then contagious.

Symptoms.—The bird carries its head low, ruffles its feathers and loses its appetite, the mucous membrane of the eye is red and swollen; the eyes water more or less.

Treatment.—A cure may be effected in the beginning by simply bathing the eyes of the affected bird with a solution of five parts of sulphate of copper (bluestone) in a hundred parts of water. The food must be warm mash, milk and vegetable in plenty.

IMPACTION OF THE CROP.—This trouble often occurs in hens too voracious or when the diet is changed and the birds eat too freely of it.

Symptoms.—The food accumulates in the crop, forming a hard mass which distends its membranous walls.

Treatment.—A dessert-spoonful of olive oil often brings back a normal state of things. When the obstruction is more obstinate the bird is made to swallow a small quantity of moderately warm milk; then an effort is made by working the crop to bring up the mass of food. Half a teaspoonful of bicarbonate of soda is administered dissolved in about a tablespoonful of water which often succeeds in causing the food to be thrown up. If these remedies fail resource may be had to surgical treatment. In that case the food is extracted by means of an incision in the crop, the feathers on the upper right hand side of the crop must be first plucked off. An incision about an inch in length is then made through the skin and membrane of the crop, this makes it very easy to remove all the food, a suture is then made, preferably with silk thread, from inside outward, and the seam is smeared with a little lard. The wound heals in eight or ten days, during which mash should be fed in small quantities.

FEATHER-EATING.—When this takes place the hens pick and eat the feathers from other birds, especially the pin feathers that are filled with blood. It is due to overcrowding, to confinement, lack of exercise and want of animal and fresh vegetable food.

Treatment.—Nothing further is necessary than to give the hens space, employment, some form of lim3, animal food and fresh vegetables. The habit is successfully and immediately controlled by a small wire fixed to the beak and the nostrils. These wires are sold by dealers in poultry supplies.

WOUNDS.—Wounds are usually not dangerous and heal up of themselves. The healing is hastened by suitable binding and washing the part once or twice a day with water.

BROODINESS.—The irresistible desire to sit that takes possession of some hens may almost be called a disease.

Treatment.—When it is wished to make hens get over their desire to sit, they should be shut up in a cool, dark, quiet place and left for two days without food; they are given only water, which will cool down the nervous fever by which they are affected. It is advisable to give them afterwards only a small quantity of grain every morning, increasing it until they take their usual amount of food. After five or six days, they are placed with the other hens, and about ten days later they resume their laying.

The following is another very simple means to break up broodiness in a hen. Tie the legs together, and leave the hens either in the poultry house or in a shed without feeding. This is an expeditious method which gives very little trouble. Several breeders practice it successfully.

FALL OF THE RECTUM.—Often mistaken for hernia of the oviduct. The commonest cause is a protracted constipation.

Symptoms.—The rectum protrudes as a soft and half globular tumour of a bluish red colour.

Treatment.—Give very cooling food; it is sometimes necessary to wash the protruding part with tepid water and to force it gently in its place. The sick bird must be kept closely confined to keep it quiet, as for instance in a box, in a dark and very dry place. After a few days if restored it can be replaced with the others.

TUBERCULOSIS.—This disease, which is regarded as incurable, sometimes affects the different classes of poultry: fowls, turkeys, ducks, &c.

Symptoms.—There are no special symptoms by which the presence of this disease can be ascertained. It is a slow disease which causes wasting; the birds often become lame or dropsical.

This disease is thought to be transmissible from man to poultry, and it is quite possible this may be correct, the infection being communicated by the spitting of consumptive people about the poultry buildings or yards.

SCURF.—A skin disease which causes the feathers to dry up and fall.

Treatment.—Wash the parts affected with soap and water to which a little perline is added, after cleansing it this way and as soon as the feathers are dry apply a little gray ointment on the skin of the cleansed parts.

WORMS.—The diseases due to the presence of parastic worms in the intestines are rather difficult to determine. The parasites may be communicated to healthy fowls from the droppings of diseased ones scattered on the ground.

Symptoms.—Fowls when affected become more or less rapidly emaciated, weak, and suffer from diarrhoea.

Treatment.—Vermifuge powders should be administered, worm seed, areca nut, kamala. Anyone of these powders may be mixed with wetted grain, to which they will then adhere. The dose should be according to the size of the bird, from 2 to 8 grains, repeated several days in succession. Salicylic acid should be added to the drinking water at the rate of 80 grains to a quart. In the diseases produced by intestinal parasites a thorough disinfection of the chicken runs, pens, &c., should be systematically carried out. Creolin is a cheap and very effective parasiticide and should be used in the strength of creoline 2 parts, water 100 parts, to be sprinkled over the premises at frequent intervals. The droppings from pens should be collected and destroyed.

LICE.—The presence of lice is frequently the result of the filthy state of the poultry house. When a fowl is infested it may be relieved in two ways: (1) By applying on the skin a little blue ointment, the size of a barley corn, divided into three or four parts under the rump, the wings and the fluff. As a rule two applications per year are sufficient, one in the autumn, another in the spring. (2) In the evening the fowl is taken from the roost and held by the legs, head downward, when a few pinches of insect powder are thrown under the wings, under the rump, on the back and on the head. When this is done the bird is quietly replaced upon its roost. Lice may be largely prevented by placing in the poultry houses or the yards boxes of dry sand or earth in which the fowls can dust themselves.

MITES.—These parasites which are especially to be feared in warm or stormy weather, must be watched with greatest attention; for they are among the dangerous enemies of fowls. It is wise to take preventive measures against them. Besides the usual precautions of cleanliness, sprinkle the roosts, joints, openings and covers with coal oil about every fortnight in summer and twice during the winter. If a poultry house is infested, it is easily seen by the following indications:—(1) When the hand is passed under the roosts, large numbers of red mites are found there; (2) A blow with a hammer on the joints, openings or corners, especially near the roosts, will bring out large numbers of mites, which will be easily seen. In such cases:—(1) Clean the room and burn the litter. (2) Sprinkle coal oil on the places above mentioned. The following day thoroughly whitewash with strong milk of lime. To make the whitewash adhere, add about two to three handfuls of coarse salt to a pailful of the whitewash. Two days later, hammer again on the infested spots, when if any mites fall they will be easily seen creeping about on the whitewash; then the application of coal oil must be repeated.

VARIOLA.—This most contagious disease is also called chicken pox.

Symptoms.—The wings and tail of the bird are drooping, the skin is hot and red the back is rounded; the bird refuses all food and breathes with difficulty.

The first days of the appearance of the symptoms, pustules form on the neck, the head, &c., they dry up into crusts of a more or less bright colour.

Treatment.—As soon as the disease appears, the affected birds must be isolated and the building disinfected. An application should be made (and, as a rule, one is enough) with a feather dipped in the following mixture:

Kerosene (coal oil).....	1 liquid ounce.
Cedar oil,.....	1 "
Vaselin	2 ounces.
Powdered sulphate of copper.	1 "
Carbolic acid.....	10 drops.

The crust which forms after the application, need cause no anxiety; it will fall off of itself. The treatment is to be supplemented by a diet composed of cooked and strengthening food, with rice water to check diarrhoea.

